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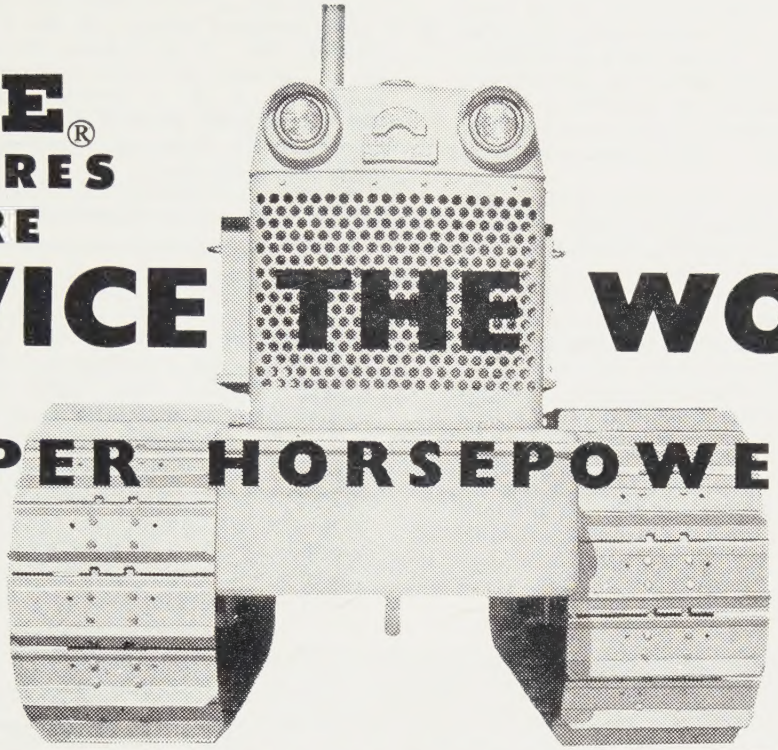

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The South Pacific Commission

The South Pacific Commission is an advisory and consultative body set up in 1947 by the six Governments responsible for the administration of island territories in the South Pacific region (Australia, France, the Netherlands, New Zealand, the United Kingdom and the United States of America).

The Commission's purpose is to advise the participating Governments on ways of improving the well-being of the people of the Pacific island territories. It is concerned with health, economic and social matters. Its headquarters are at Nouméa, New Caledonia.

The Commission consists of not more than twelve Commissioners, two from each Government. It normally holds one Session each year. There are two auxiliary bodies, the Research Council and the South Pacific Conference.

There is a Research Council meeting once a year. This may be either a meeting of the full Council, or of one or other of its three main sections, specializing in the fields of health, economic development and social development. Members of the Research Council are appointed by the Commission. They are selected for their special knowledge of the questions with which the Commission is concerned, and the problems of the territories in these fields. The chief function of the Research Council is to advise the Commission on what investigations are necessary. Arrangements to carry out those that are approved are the responsibility of the Secretary-General and other principal officers.

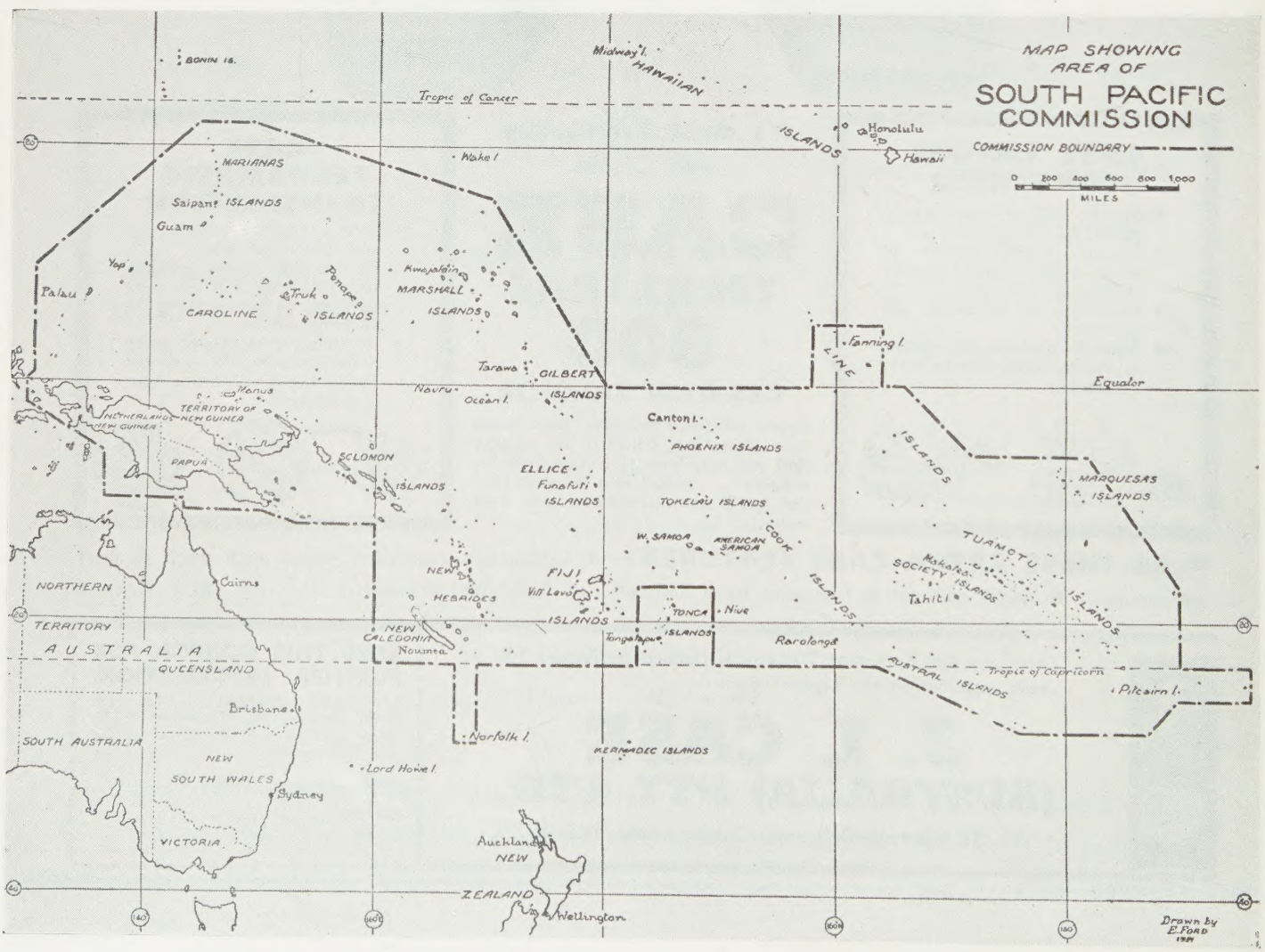
The South Pacific Conference, which meets at intervals not exceeding three years, consists of delegates from the local inhabitants of the territories, who may be accompanied by advisers. The first Conference was held in Fiji in April 1950, and was attended by delegates from fifteen territories and from the Kingdom of Tonga. The second Conference was held at Commission headquarters in April 1953. The third Conference was held in Fiji in April-May 1956.

The principal officers of the Commission are: Secretary-General, Mr. T. R. Smith; Executive Officer for Health, Dr. E. Massal; Executive Officer for Economic Development, Dr. A. H. J. Kroon; Executive Officer for Social Development, Dr. Richard Seddon. The powers and functions of the Deputy Chairman, Research Council, are exercised by the Secretary-General.

Further particulars of the Commission's activities may be obtained from the Secretary-General, Nouméa, New Caledonia.

FRONT COVER PHOTOGRAPH

At Denver, Colorado, last October, a "South Pacific Night" was held during the eighth assembly of United Church Women. The South Pacific Commission's deep appreciation of the latter body's $30,000 grant to assist its newly-launched women's interests project was conveyed at this function by guest speakers Dean Knowles A. Ryerson, Senior Commissioner for the United States on the South Pacific Commission (on stage in photograph) and Miss Edna H. Barr, of the Office of Dependent Area Affairs, United States Department of State, Washington, D.C. (See article on page 24.)



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EDITOR: *A. E. Read, B.Sc.*

THE SPC QUARTERLY BULLETIN, first published in January, 1951, features articles on selected activities in the Commission's three main fields of operation: economic development, health and social development. Articles are also contributed by specialists working in these and related fields, in the territories within the Commission area.

THE BULLETIN is given selective world distribution to people and institutions in widely differing fields sharing a common interest in the purposes and work of the Commission. It is published in two editions, English and French.

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ALL OTHER ENQUIRIES relating to the SPC QUARTERLY BULLETIN should be directed to. The Editor, South Pacific Commission, Nouméa, New Caledonia.

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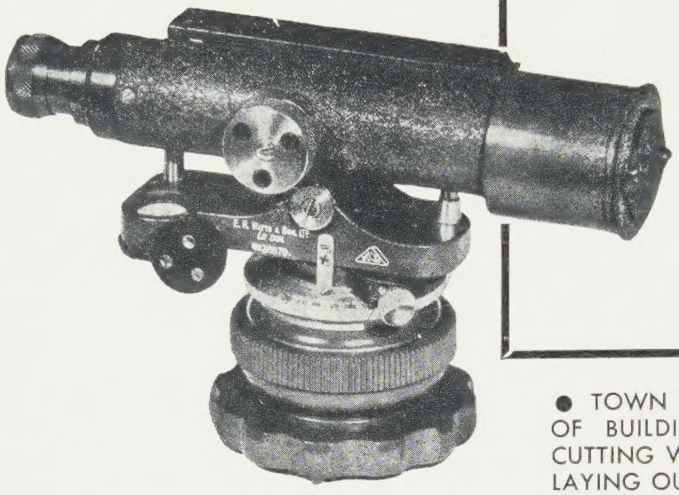

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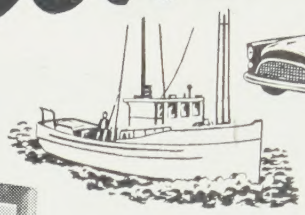

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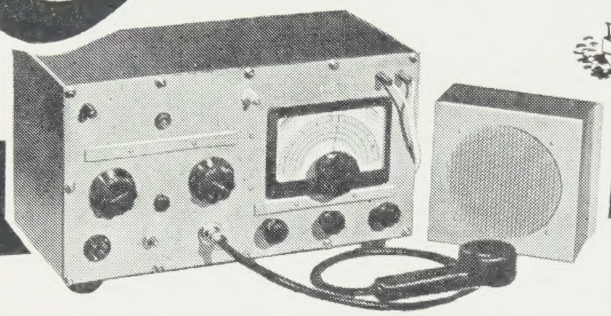

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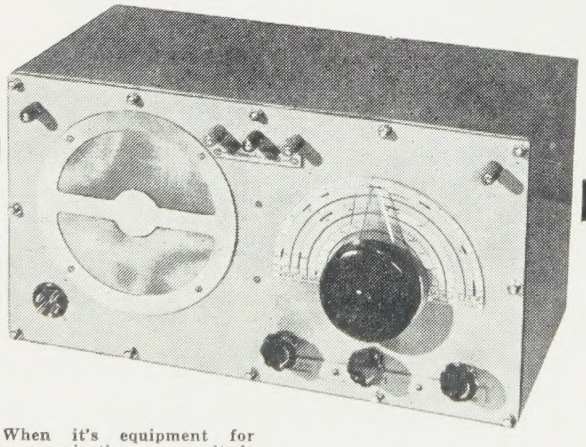

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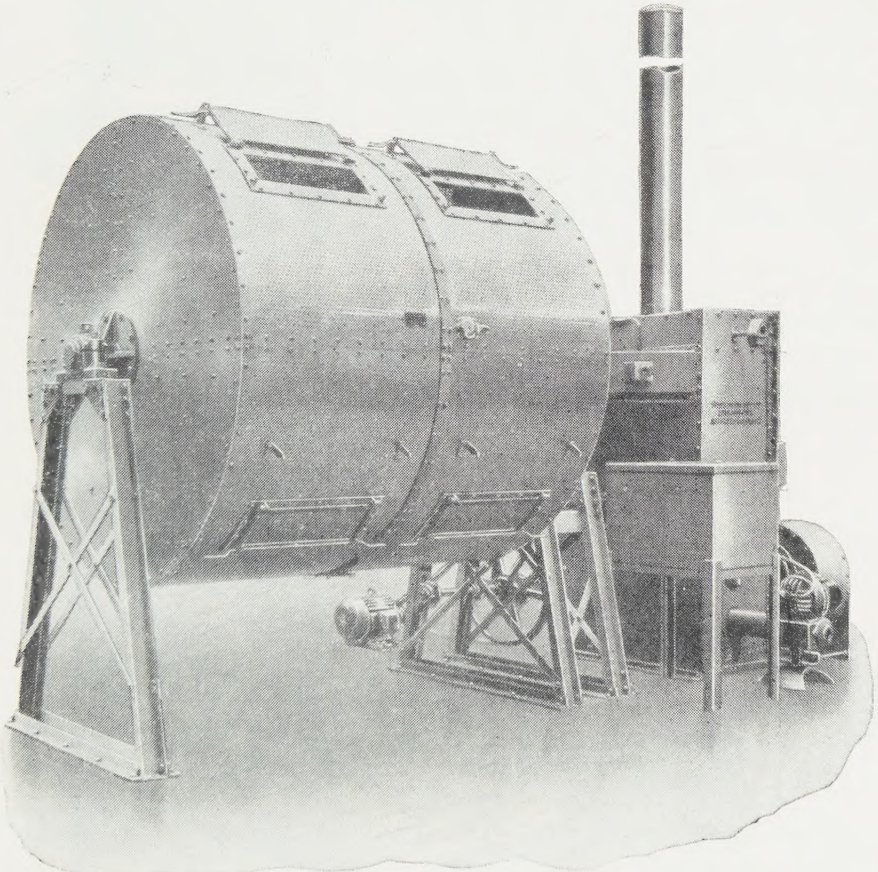

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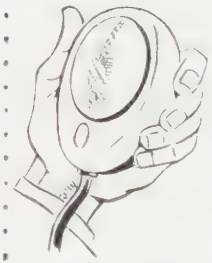

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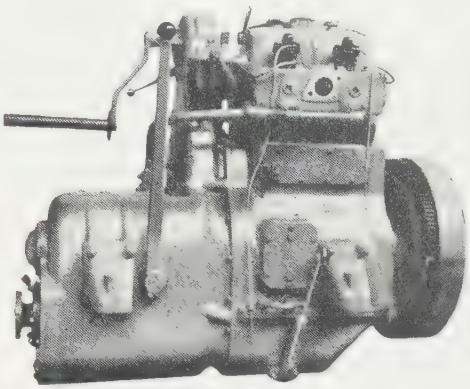

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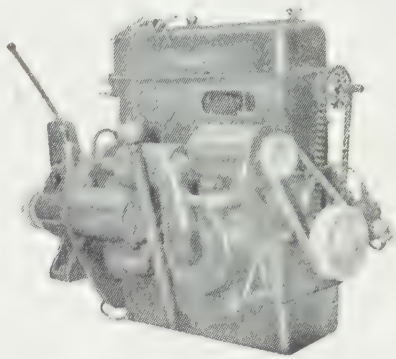

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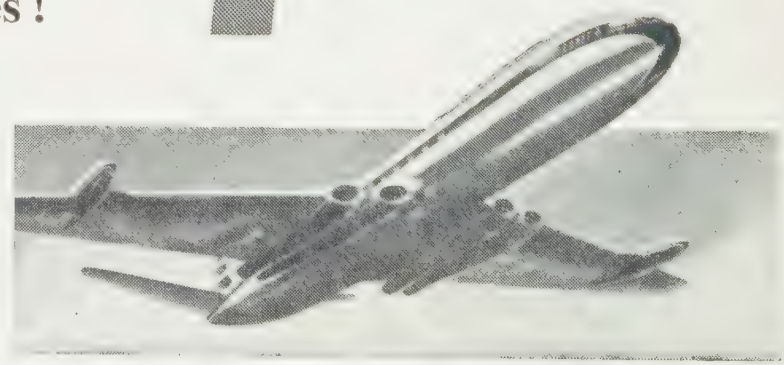

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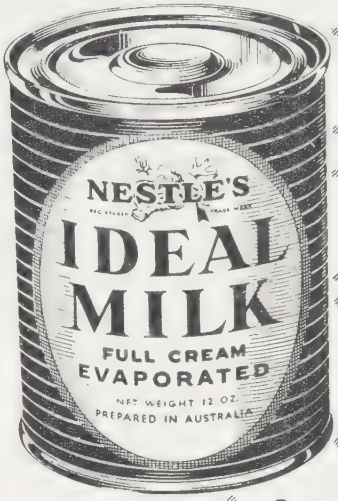

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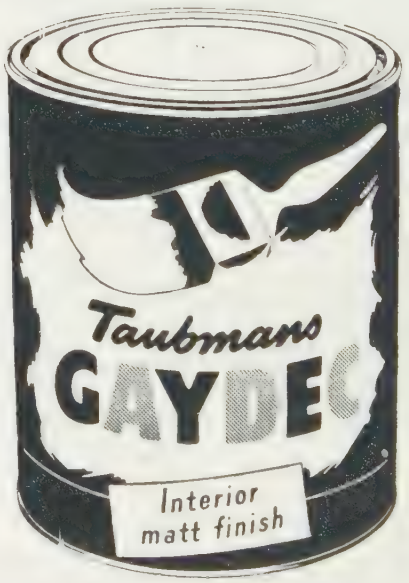

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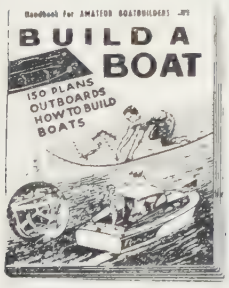

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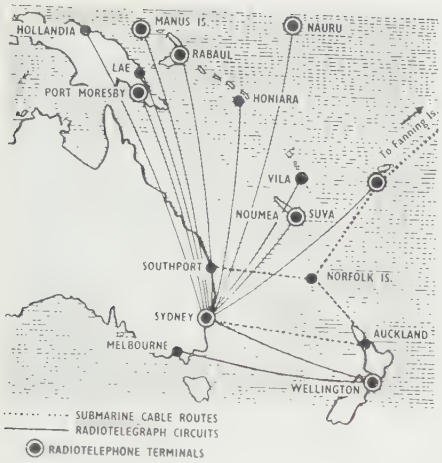

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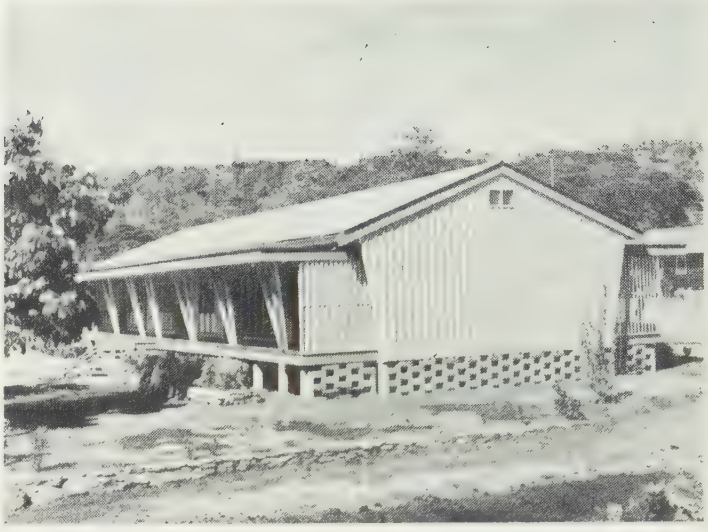


Above: The administration block of the Malaguna Technical Training Centre, where the Conference will be held. Right: One of the classrooms.

Conference Of Pacific Island Peoples In Rabaul

Sixty-five representatives from seventeen Pacific island territories will attend the fourth South Pacific Conference, which will be held at Rabaul, New Britain, in the territory of Papua and New Guinea, from April 29 to May 13. The Conference is being organized by the South Pacific Commission, of which it is an auxiliary body.

DELEGATES attending the Conference will represent more than three million inhabitants of many hundreds of islands and atolls scattered over thirteen million square miles of Pacific Ocean.*

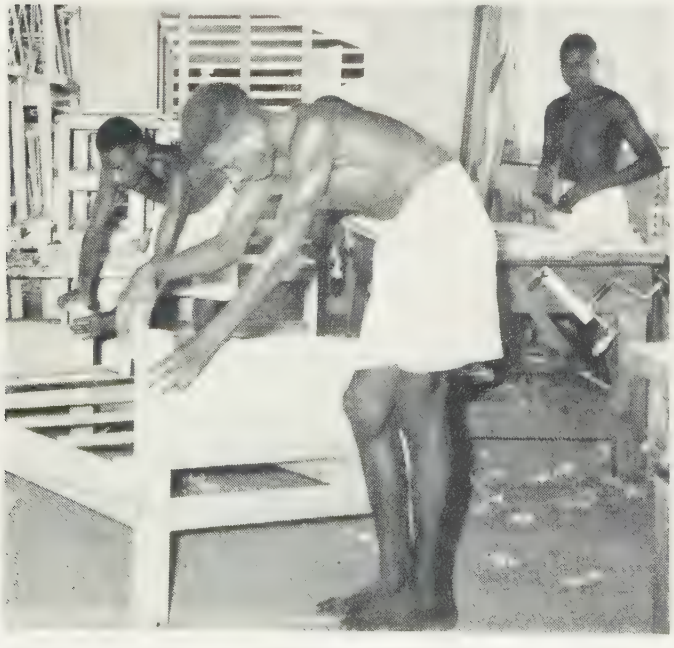
Delegates from the Gilbert & Ellice Islands will travel by ship to Honiara in the British Solomon Islands, and will then, with the representatives for that territory, proceed by air to Rabaul.

Delegates from other territories south of the Equator and east of New Caledonia will assemble at Nouméa, and on April 26 will be flown by chartered aircraft direct to Lae and thence to Rabaul. This special service will carry the delegations from French Polynesia, the Cook Islands, Wallis and Futuna Islands, Western Samoa, American Samoa, Niue, Tonga, Fiji, the New Hebrides, and New Caledonia, together with secretariat staff of the South Pacific Commission.

From north of the Equator, representatives from Guam and the United States Trust Territory of the Pacific Islands will fly to Rabaul via Manila, Biak, Hollandia, and Port Moresby.

Observers from various international bodies including the World Health Organization, and from universities, research institutions and missionary organizations, will also attend the meeting.

* By invitation, a delegation is attending from the independent Kingdom of Tonga, which is not in the Commission area. A list of delegates and observers who will attend the Conference appears on page 61.



Students at Malaguna Technical Training Centre undergo a four-year course of training in woodwork, metalwork, and drawing. Here, carpentry students are at work.

Malaguna School Will Be Conference Headquarters

The Conference will be held in the modern buildings of the Malaguna Technical Training Centre, which is pleasantly situated on the shores of Simpson Harbour, about a mile from Rabaul. Lawns and colorful flower gardens surround the school buildings in which the delegates will be housed.

The Conference Hall is centrally situated in the school grounds. A section has been set aside for observers and visitors, and provision has been made for an interpreting service for delegates

(Continued on page 61)

Composite panoramic view of Rabaul Harbour and township dominated by Mt. Kombiu (The Mother). The harbour, flanked by the volcanoes Matupi and Vulcan, provides safe anchorage and facilities for a large inter-island fleet and the numerous vessels loading copra, timber and cocoa produced in New Britain, New Ireland and Bougainville Districts. Devastated by the eruption of 1937, and subjected to intensive bombing during the Japanese occupation of 1942-45, the township, with its many modern buildings, has resumed an appearance of thriving growth in a setting of tropical luxuriance.

Picturesque Rabaul Is Main Port Of New Britain

Those visiting Rabaul for the fourth South Pacific Conference will find much of interest in this picturesque town and the country around it. Highlights are described in this article, which opens with a brief historical note on the discovery and early development of New Britain.

LARGEST and most important of the islands of the Bismarck Archipelago is New Britain, one of the richest areas in the territory of Papua and New Guinea. At the north-east extremity of the island, on the shores of Simpson Harbour, an almost land-locked arm of Blanche Bay, lies Rabaul, the main port.

New Britain Named By Dampier

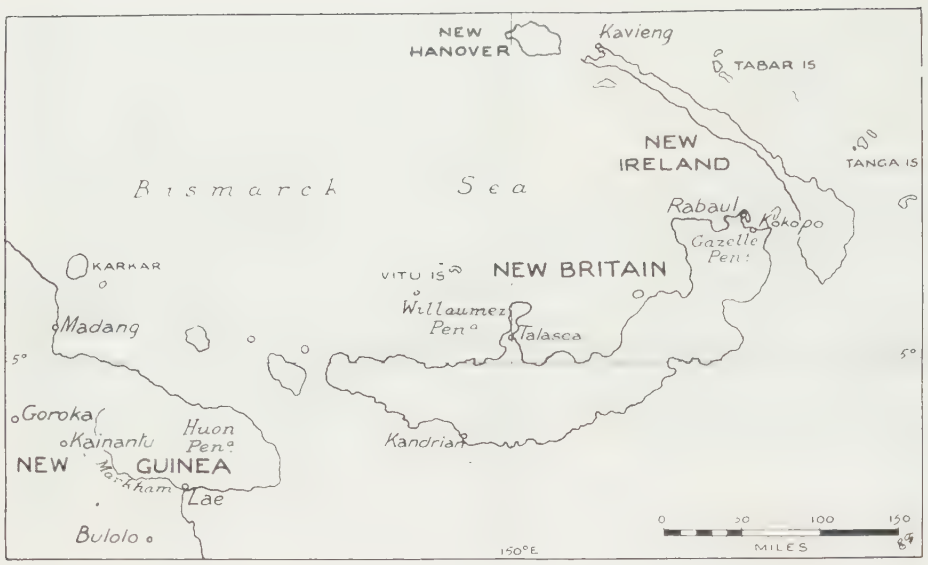
New Britain, which was named in 1700 by the English navigator-explorer, William Dampier, was one of the earliest islands of the Group to be settled. It is about 300 miles long with an average width of 50 miles. Its area is 14,600 square miles.

Simpson Harbour and Blanche Bay were named by Captain Simpson of *H.M.S. Blanche* in 1872. A German company which had traded with the island for some years before that had established a shore station there in 1873, while some Australian traders also operated there about that time.

The Methodist Mission worked in New Britain from 1875, although its original station was on the Duke of York's Islands. The Roman Catholic Mission of the Sacred Heart was established on the island in 1882.

In 1884, following the Dutch claim of the western portion of the main island of New Guinea and the establishment of a protectorate by the Imperial

New Britain growers splitting cocoa pods and extracting beans prior to loading into fermentation boxes.



New Britain lies to the north-east of the New Guinea mainland.

Government over the southern part of the remainder, Germany claimed the northern portion of the main island and the Bismarck Archipelago.

Formerly Part Of German Colony

New Britain was formerly part of the German Colony of New Guinea. Following the First World War (1914-1918), when it was occupied by Australian troops, the Colony became a League of Nations mandate, administered by Australia.

Since 1946, New Guinea has been a United Nations Trust Territory, with Australia as the administering authority. The Papua and New Guinea Act provided for the linking of New Guinea with Papua as the Territory of Papua and New Guinea, in an administrative union.

A Fertile Island

New Britain, which is largely mountainous, with peaks up to 7,000 feet, is one of the most fertile islands of the Territory. Along the coast are numerous small harbours, and many coconut plantations have been established on the flat country around these havens. Plantations, Administration posts, missions with their hospitals and schools, and some trade stores, have created centres such as Jacquinot Bay, Gasmata, Kandrian and Arawe on the south coast, and Talasea on the north coast.

Last year, exports from Rabaul, which included 31,605 tons of copra, 14,802 tons of coconut oil, and 2,165 tons of cocoa beans, represented 40 per cent. of the total exports of Papua and New Guinea. The external trade of the port in 1957-58 totalled £9,500,000.

Copra, cocoa beans and timber are the island's most important products. Cocoa is a crop rapidly growing in importance, especially to native smallholders, who have planted more than two million trees. It is estimated that ultimate production from native plantings alone will approximate 2,000 tons a year.

Native Local Government Councils

A major aspect of the Administration's activities in Papua and New Guinea has been the advancement of the native people.

Native local government councils are now a feature throughout the territory. First formed in New Britain in 1950, they now have a wide range of activities. Projects, financed from the tax revenues of the councils, cover the fields of health, education, roads and transport. Major contributions have been made by these councils to district progress, particularly through the erection of school buildings, medical aid posts, and by providing funds for public utilities such as new cocoa fermentaries.

Councils have purchased and are operating trucks, tractors, and small ships to enable native producers to get their produce to market. They are also taking an active part in promoting economic development through improvement in the quality and quantity of agricultural production. In the Tolai cocoa project, three thousand farmers in the area supply wet cocoa beans to fourteen council-owned fermentaries, which process and market the beans and, after deducting costs, pay growers the proceeds.

The farmers play a key part in the control of the project through fermentary committees and through the project's board of management, on which the Tolai people have a majority.

Last year, production was more than 500 tons of cocoa, and the last six-monthly payment to growers totalled £92,000.

Keravat Agricultural Experiment Station

The Keravat Agricultural Experiment Station, near Rabaul, has been responsible for much of the cocoa development. On this 5000-acre station, research workers are concentrating on important aspects of cocoa cultivation, including development of improved varieties, use of shade, spacing of trees, inter-planting with other crops, and fermentation of beans.

Work is also being done at Keravat on coconuts, coffee, manila hemp and other tropical crops, including rotation experiments with native food crops, while research is being carried out by entomologists and a pathologist on insect pests and plant diseases.

Land Settlement Schemes

Experts forecast continuing agricultural expansion as new lands along the Warangoi River, thirty miles from Rabaul, are brought into production.

One land settlement scheme is being developed by the Vunamami Native Local Government Council to provide land for its people; other land settlement

(Continued on page 55)

Nodup co-operative store in the Rabaul area has a turnover of around £800 a month. In addition to its retail business, the co-operative purchases copra and other produce from its members.

A blue lagoon and palm-fringed beaches of golden sands are attractions of Yanuya Island, in the Mamanuca Group. This lies to the south of the larger and better-known Yasawa Group, which is a Mecca for most visitors to the Fiji Islands.

Tourist Industry Flourishing In Fiji

Tourist spending in Fiji, estimated at £F34,590 for 1949, is likely to exceed £F900,000 for this year, ten years later. Future prospects are correspondingly bright for the industry, which has strong official support.

By G. BEZAR

ONCE upon a time the Cinderella industry of Fiji, tourism is now making such rapid strides, and is so strongly supported, that it looks like becoming the Colony's third industry. If it continues its present progress, by 1961 it will be topped only by sugar and copra.

Sugar, which at £7¼ million for 1958 brought in more than half the Colony's revenue from exports, is almost at saturation point owing to the International Sugar Agreement, which limits the amount each sugar-producing area can export. Indeed, the Colonial Sugar Refining Company, which runs the sugar industry in Fiji, will close its Nausori mill at the end of this year because its four other mills in the Colony can produce all the sugar the Company is allowed to export.

Copra, Fiji's number two industry, accounts for exports of around £2½ million a year. Scope for development here is not great, because drought and hurricane have taken toll of a number of plantations. Overhanging the industry is the threat of the rhinoceros beetle. A constant menace, unending vigilance is necessary to keep it out of the copra-producing islands in the Group.

Gold is the third industry in the Colony at the moment, but difficulties in mining it have resulted in the Government agreeing to a subsidy of £2 per fine ounce. So, although gold exports bring in over £1 million a year (£1,140,000 last year), this industry costs the Colony about £150,000 annually in subsidies.

It could be fairly said that tourism is already jockeying for third place in the Colony's industries, in nett gain if not in total income, for it is estimated that last year it brought something like £800,000 into Fiji. This year it is expected that the £900,000 mark will be exceeded.

With the completion of the airport extensions at Nadi at the end of this year, and the possibility of 200 additional hotel bedrooms being provided during 1960. the revenue from tourism could soar to well over £1 million next year.

Indeed, the figure for 1960 may be much more, for it is only lack of accommodation that has kept the tourist industry so much below that level for the last two years.

If the 200 extra bedrooms expected in the next two years become a fact, the bedrooms for tourists will have increased by 50 per cent. It is anticipated that all these will be booked in the tourist season. If they are, it will mean that with 50 per cent. more bedrooms there should be fifty per cent. more tourist spending—and that means a total spending of £1,400,000 in, say, 1961.

In January this year travel agencies were already at their wits' end seeking accommodation for would-be visitors to Fiji. By February they had abandoned all hope of getting any more accommodation for the peak months of May and June, and were just replying "Sorry" to people wanting to spend a holiday in Fiji.

Fijian warriors performing a "meke wesi"—a spear and fan dance which depicts some event in past history. The spears are not used for throwing, but as lances. The fans are used to distract the attention of adversaries.

Above: Climax of the annual Hibiscus Festival is a colourful procession of floats through Suva, and the selection of Miss Hibiscus of the Year. This float in the last Festival depicts a Fijian seated before a yaqona bowl, while in the cup which the figure is offering with true Fijian hospitality is seated one of the attractive Miss Hibiscus entrants. Right: Traditional Fijian ceremonies were staged in the grounds of the Beachcomber Hotel at Denba for tourists from the cruise ship "Kungsholm" when she visited Suva recently during a world tour. They included the yaqona (kava) ceremony, and mekes (war dances).

The heartening side of this frustrating aspect of tourism is that it indicates the ever-growing popularity of Fiji with tourists. Stimulating, too, is the fact that the wealthy Americans are coming in increasing numbers in what is normally the off-season for tourists—October to March. Hotels which normally have been practically empty for most of that time have had a steady flow of Americans. Several times they have been booked out.

New Hotel Opened Last December

First major step in providing more hotel accommodation was the opening last December of the new Club Hotel in Suva where the shortage of accommodation is most acute. The hotel is in the heart of the city, and has that amenity beloved of Americans travelling in the tropics—air-conditioned bedrooms.

It is one of the Northern Hotels chain, which already owns the famed Korolevu Hotel with its picturesque thatched native *bures*. Six luxury *bures* have been added at Korolevu during 1958, and six more are to be built in time for the opening of this year's tourist season.

Northern Hotels are already planning for another hotel for Suva; one of 30 bedrooms.

Much more ambitious hotel plans are in the air, however, and if they mature (as seems very likely at present) Fiji will have another 200 bedrooms to offer to tourists. It is hoped that this will solve the acute accommodation problem—for a few years at any rate.

Most talked-of proposition at the moment is the Government-owned Grand Pacific Hotel. The Union Steamship Company, which has held the lease of the hotel for the past 45 years, is surrendering it on April 23. The Government have offered the hotel, furnished, on a 99-year lease, a condition being that the successful tenderer must modernise and extend the existing hotel.

Built in 1914, it is spacious, lofty, and substantially built in reinforced concrete and stone. It stands in delightful grounds fronting on to the sea, with views of distant islands and mountain scenery.

The Grand Pacific enjoys international fame and is claimed to be the most famous hotel in the South Seas. It has seen the pomp of Royal occasions. Its romantic atmosphere has inspired novelists and playwrights. It stands at the hub of the Pacific—at a cross-roads of the sea and air routes which join the American Continent with Australia, New Zealand and the Far East.

At the other end of the main island of Viti Levu, about 120 miles away, another 100-bedroom hotel is actively under consideration. Proposed site is Saweni Beach, about seven miles from Nadi Airport. A leading Canadian syndicate is pursuing the proposal. The idea is to make an attractive beach hotel on the most modern lines. Plans have been prepared and the syndicate has an option on the site, which is one of the loveliest in Fiji.

Seaplane Service To Outer Islands

Hotel development—of paramount importance though it is—is not the only progress which the tourist industry is making in Fiji. Transport is also progressing, and it is hoped that this will help the outer islands, which, although gems of scenic beauty, are by-passed by 90 per cent. of the tourists because of the time taken to reach them. A new inter-island seaplane service is starting up this year, and return visits to islands, which formerly took at least two days, will be accomplished in two hours.

Richest benefit from this service will, it is hoped, be reaped by the island of Ovalau, with its township, Levuka, which was formerly the capital of Fiji. This is historically one of the most interesting islands in the Group, for it was there on October 10, 1874, that King Cakobau and the chiefs of Fiji signed the Deed of Cession which gave Fiji to Queen Victoria. On the seafront stands the Stone of Cession, marking the exact spot where the Deed was signed.

Levuka is a picturesque town and Ovalau is a lovely island. The valley of Lovoni, a few miles from Levuka, is a scenic gem with an unspoiled Fijian *koro* nestling in a fertile valley between towering crags.

Ovalau, once rejoicing as the capital of Fiji, and later an important centre of the copra trade, has lost both these assets, and is now concentrating on creating an atmosphere and a service for the enjoyment of tourists.

A Stride Into Yesterday

Taveuni—which its enthusiasts claim unequivocally is the most beautiful island in the Pacific—has an unique tourist attraction to add to its beauty. It possesses the only motor road in the world through which runs the 180th meridian, and the International Date Line.

In January, the Governor, Sir Kenneth Maddocks, unveiled a bronze plaque to mark the spot where the meridian line runs across the Taveuni coast road. The plaque was donated by his predecessor, Sir Ronald Garvey.

On the one side of the line it is "today", on the other side, "yesterday". By striding from one side of the line to the other one can either lose or gain 24 hours. What a spot for tourist snaps! (There could be chaotic complications if Fiji strictly observed this dividing date line, but for the convenience of

(Continued on page 62)

Above: Part of a handline catch of sweetlip, schnapper, trevally and kingfish, taken during Mr. van Pel's investigations. Right: Mr. Harold Allen, 85-year-old Norfolk Island fisherman, caught this huge grouper during the survey.

Norfolk Island Fisheries Survey

Though popular edible species of fish are very plentiful around Norfolk Island, transport and marketing of catches offer serious problems.

By H. VAN PEL*

NORFOLK Island is the only territory within the South Pacific Commission's area which does not have a tropical or sub-tropical climate. Its flora and fauna are quite different from anything found in other South Pacific territories.

* Fisheries Officer, South Pacific Commission.

Norfolk Island, five miles long by three wide, is situated on an underwater plateau, sixty miles by twenty. The island has a population of about 1,025. Seabirds and rabbits alone inhabit two smaller islands nearby.

Depths over the underwater plateau vary, but the bottom is invariably rocky. Both pelagic fish such as bonito, tuna and kingfish, and coastal or bottom species such as sweetlip and grouper, are very plentiful around Norfolk Island, and large catches can be taken in a variety of ways.

Small motor fishing boats are used. Due to the absence of any harbour or shelter they have to be launched and landed by a crane on a small pier, and can operate only in good weather.

Fishing with poles or handlines from the rocky shores is popular, though most of the fishing is done from boats. Bulk of the catch is provided by the sweetlip Emperor (*Lethrinus chrysostomus*), but other species such as grouper, trevally, kingfish, bonito, shark and stonefish are also caught in quantities.

Special mention must be made of the "dream fish". So far I have not been able to obtain a correct identification of this fish, but I have been informed by reliable persons that eating it very often results in nightmares.

A whaling station has been established on Norfolk Island and its allotted quota

(Continued on page 36)

Humpback whale being flensed at the Norfolk Island whaling station.

Pacific Scientists Review Rhinoceros Beetle Campaigns

This group photograph was taken following the opening ceremony. Front row (l. to r.): Dr. Y. Tanada (University of California), Dr. A. H. J. Kroon (SPC), Mr. P. D. McDonald, C.M.G., Dr. C. E. Pemberton (Hawaii). Back row (l. to r.): Dr. P. Surany (SPC), Mr. B. A. O'Connor (Fiji), Dr. C. P. Hoyt (SPC), Mr. L. J. Dumbleton (New Zealand), Mr. R. P. Owen (Caroline Islands), Mr. T. R. Cowell, Mr. H. W. Simmonds (Fiji), Mr. J. M. Watson (Fiji), Mr. G. S. Dun (Papua and New Guinea), Mr. N. L. H. Krauss (Hawaii).

Present campaigns in the Pacific for controlling the rhinoceros beetle were reviewed, and long-term plans made for future work, when the Commission's technical advisory committee on the beetle met in Suva from February 16-19.

By A. H. J. KROON*

EARLY in 1953 the South Pacific Commission decided to launch a long-term research project on the rhinoceros beetle. Its aim is to find means of control of the beetle suitable to South Pacific conditions.

A technical advisory committee was established in 1954 to assist the Executive Officer for Economic Development and the Commission's entomologist in the conduct of this project.

This Committee met in Suva from February 16-19 last to discuss and evaluate all pertinent findings made by the Commission and territorial entomologists, and to advise on the future work on this problem. The meeting was held in the conference room of the Fiji Native Trust Lands Board at Suva.

The Governor's Deputy, Mr. P. D. McDonald, C.M.G., opened the meeting and welcomed the delegates on behalf of the Government of Fiji. The Second Commissioner for the United Kingdom on the South Pacific Commission, Mr. T. R. Cowell, and Mr. J. M. Watson, O.B.E., Director of the Fiji Department of Agriculture and a member of the SPC Research Council, were also present.

Mr. McDonald stressed the potential danger of the rhinoceros beetle to the economy of Fiji, and briefly reviewed the costly efforts being made to prevent it from developing into a serious pest. However, a solution of the problem had so far not been found. Recognizing that the problem was very complicated and

* Executive Officer for Economic Development, South Pacific Commission.

SPC Rhinoceros Beetle Technical Advisory Committee Meeting: Attendances

MEMBERS

Mr. L. J. DUMBLETON	Principal Scientific Officer, Entomology Division, Department of Scientific and Industrial Research, Lincoln, New Zealand.
Mr. G. S. DUN	Senior Entomologist, Lowland Experiment Station, Department of Agriculture, Stock & Fisheries, Keravat, via Rabaul, Territory of Papua and New Guinea.
Mr. B. A. O'CONNOR	Senior Entomologist, Department of Agriculture, Suva, Fiji.
Mr. R. P. OWEN	Staff Entomologist, Koror, Palau District, Caroline Islands, Trust Territory of the Pacific Islands.
Dr. C. E. PEMBERTON	Chairman, Invertebrate Control Consultants Committee, Honolulu 14, Hawaii.
Mr. H. W. SIMMONDS	Entomologist, Suva, Fiji.

Owing to delays in air services the following Committee members were unable to attend the meeting:

Mr. F. COHIC	Chief of Entomology Laboratory, French Institute of Oceania, Noumea, New Caledonia.
Mr. P. S. DALE	Entomologist, Department of Agriculture, Apia, Western Samoa.
Dr. J. HERRING	Entomologist, Department of Agriculture, Pago Pago, American Samoa.

INVITED SPECIALISTS

Mr. N. L. H. KRAUSS	Entomologist, Territorial Board of Agriculture & Forestry, Pawaa Station, Honolulu 14, Hawaii.
Dr. Y. TANADA	Assistant Insect Pathologist, Department of Biological Control, University of California, Albany 6, California, U.S.A.
Mr. M. MULLER	Pest Control Officer, Department of Agriculture, Vava'u, Tonga.

SOUTH PACIFIC COMMISSION

Dr. C. P. HOYT	Technical Officer (Pests & Diseases).
Dr. A. H. J. KROON	Executive Officer for Economic Development.
Dr. P. SURANY	Insect Pathologist.

The Governor's Deputy, Mr. P. D. McDonald, C.M.G., welcomes Dr. A. H. J. Kroon to the meeting while Mr. B. A. O'Connor looks on. Mr. O'Connor was elected Chairman.

would need time and hard work before real success could be obtained, he expressed the hope that the meeting would make a realistic contribution to its solution.

"The present situation is somewhat like the 'cold war'. We are simply containing the beetle; without further reserves and support we cannot defeat it. That is where we seek your help", Mr. McDonald said.

The meeting was attended by six members of the Technical Advisory Committee. It was unfortunate that three remaining members could not attend due to delays in air services. Also present were three invited specialists and three officers of the South Pacific Commission.

Dr. A. Kroon, Executive Officer for Economic Development, reviewed the work being carried out by the Commission on the rhinoceros beetle, and made special mention of the important work done in the territories by the territorial departments concerned. He stated that research and technical institutions and agencies are showing increasing interest in the Commission's rhinoceros beetle project.

Mr. B. A. O'Connor, Senior Entomologist of the Fiji Department of Agriculture, was elected chairman of the meeting.

Technical Discussions On Control Methods

Technical discussions began with a general consideration of physical control methods, including clean-up operations, observations on the influence of obstructive vegetation as ground cover and miscellaneous trees in the coconut groves; chemical treatment of palm crowns, and attractants. Field sanitation and quarantine measures were also discussed.

Mr. R. P. Owen, Staff Entomologist, Koror, Trust Territory of the Pacific Islands, showed a well-prepared and instructive film dealing with sanitation measures and biological control work by a wasp, *Scolia ruficornis*, in the Palau Islands.

The Commission's insect pathologist, Dr. Paul Surany, presented a review of his work on *Oryctes* diseases and ecology, illustrated by several hundred photographic slides. He stated that one of the diseases, possibly a virus disease, may kill 90 per cent or more *Oryctes* larvae under natural conditions. Much of Dr. Surany's work is of a pioneering nature.

Biological control by parasites and predators was discussed in considerable detail. In the forefront was the parasitic wasp, *Scolia ruficornis*, on which valuable work is being done by Mr. Owen (T.T.P.I.) and Mr. H. W. Simmonds (Fiji).

Collection of Parasites and Predators

At its eighteenth (1958) session, the Commission had authorized arrangements to be made for the collection of predators and parasites from West Africa, Central America and northern South America, and valuable advice was given by the Committee on the ways in which the Commission's decision should be carried out.

Madagascan Investigations for SPC

The Committee recognized the importance of the ecological investigations being carried out in Madagascar by the Scientific Research Institute of Madagascar under a Commission grant.

The Committee prepared a report of the meeting in which a considerable number of recommendations are given.

Not only did the meeting fulfil its task with great enthusiasm; it also gave valuable advice to the South Pacific Commission, and as well, afforded participants, many of whom are working under rather isolated conditions, a chance of interchanging information. It is felt that great benefit can be derived from technical meetings which fill these needs.

Last, but not least, it must be stated that the facilities, assistance and hospitality provided by the Government of Fiji greatly contributed towards the success of the meeting in every aspect.

Nutrition Expert Arrives For SPC Assignment

On February 20 a nutrition economist from Manila, Miss Manuela G. Maramba, arrived at Commission headquarters to work for one year on the Commission's nutrition programme. Miss Maramba is a food planning specialist with the National Economic Council of Manila, and her services were made available to the Commission as a Technical Assistance mission by the Food and Agriculture Organization of the United Nations.

Part of her job in the Philippines is to see that the country's food requirements are produced. "If the economists ran the country they would tend to produce only cash crops", she explained. "Our task is to try to relate food production to the people's needs."

After visiting Fiji for talks with nutrition specialists of the South Pacific Health Service, Miss Maramba left for Guam. She will work for a period in the United States Trust Territory of the Pacific Islands in response to an invitation from the local administration to study nutrition problems there.

Wastage Of Coconuts Causes Serious Copra Losses

Year by year the ageing coconut palms in many Pacific plantations are yielding less copra. Many territories are planning or carrying out re-planting programmes that will restore production, but the new plantings will not come into full yield for some years.

In the meantime, many territories could greatly increase their copra output by eliminating wastage of nuts, which occurs mainly through fallen nuts lost in undergrowth, heavy consumption of green nuts for drinking, and losses caused by pests such as rats and flying foxes.

Experts consider that if such losses could be eliminated, copra production throughout the Pacific would rise steeply —in some islands by as much as fifty per cent.

Guest speakers at "South Pacific Night" held in Denver, Colorado, last October, during the eighth assembly of United Church Women, were Miss Edna Barr of the State Department, Washington, and Dean Knowles A. Ryerson, Senior Commissioner for the United States on the South Pacific Commission. The speakers conveyed the Commission's appreciation of United Church Women's grant to assist its women's interests project.

Wider Interests For Pacific Women

Last month Miss Marjorie Stewart arrived at Commission headquarters to take up duties as women's interests officer. It will be her task to establish and develop a women's interests project that will run for some three years. Her first headquarters will be at Aitutaki in the Cook Islands. The story of this project is told below . . .

By BRUCE ROBERTS

THE story of the Commission's women's interest project is a significant one. It illustrates how inter-territorial help and co-operation is growing in the Pacific; and it shows how the island people themselves, territorial administrations, metropolitan governments —and in this instance a women's organization in the United States, United Church Women—can and do all work together for progress in the Pacific.

The story starts with the second South Pacific Conference held in Nouméa in 1953. As the result of a most invigorating discussion on the rôle of women and women's organizations in the community, stimulated by an introductory paper prepared by the Papuan delegation and presented by Miss Tani Sisa, the island delegates asked the Commission to see how it could help the various women's organizations in the South Pacific to co-operate more effectively with each other, and generally to see how it could assist the development of women's interests in the region.

The essential purpose of what was suggested by the Conference was extremely well put in the paper referred to—"It is no use having a new, strong hull fastened to an old, badly-lashed outrigger; for then, when the big waves come, the outrigger will break, the hull will be swamped, and the people on the canoe will drown. It is the same with a village: the men are the hull, we women are the outrigger. If, while the men learn to do and to understand new things, we remain ignorant and backward, then we may cause the whole village—even our whole people—to be ruined. But if we work and train ourselves, then we shall be like a strong outrigger, and our village, like the well-built canoe, will be safe even in rough seas."

The Commission's Research Council, which, like the Conference, is made up of people with first-hand experience of island problems, supported this request. The Commission therefore provided funds to begin the collection and exchange of information between the various women's groups about their activities.

Exchange Of Information Not Sufficient

After a year or two it began to be realized that a general exchange of information of this kind was not sufficient. There are a very large number of women's organizations in the Pacific; they work in many different ways, have different needs, and speak different languages. While many are keenly interested in what others are doing, some felt that more personal contacts and help with actual practical training would be better than just a written exchange of general information. Both the third South Pacific Conference and the eighth Research Council meeting recommended that the Commission should appoint its own women's interests officer to facilitate this.

Now, although the South Pacific Conference and the Research Council make their recommendations to the Commission, their voices are heard very much further afield. The territorial administrations which send delegates to the Conference, and the metropolitan governments which provide the Commission's funds, take a close interest in the recommendations which the Conference and the Research Council make. The members of the latter bodies, either having their homes in the islands or having had many years' experience working there, speak their views freely and indepen-

Miss Marjorie Stewart, newly-arrived SPC women's interests officer. Following a brief stay at Commission headquarters and a visit to the Solomon Islands, Miss Stewart will attend the fourth South Pacific Conference, which opens at Rabaul on April 29. She will then go to Aitutaki in the Cook Islands, first location of the women's interests project. Miss Stewart's last post was that of Director of the Y.W.C.A. tropical community development centre in London.

dently. Thus their findings and recommendations form a valuable statement of problems which are engaging the attention of those who should know.

Their repeated emphasis on the importance of promoting the interests of women in the islands has greatly encouraged the governments and voluntary organizations which were already doing much work in this field, and they have increased still further the efforts being devoted to it. One territory alone is now spending over £100,000 a year on the advancement of women in its area, and every territory has a growing interest in finding out how best it can meet the needs of the situation.

SPC Assists Travel For Women

While the recommendations of the Conference and Research Council have had good effects in the territories themselves, they have also formed the basis of the Commission's own work in the field of women's interests. As a result of their emphasis on the value of personal contacts, the Commission provided funds in 1958, and again in 1959, to help representatives of women's organizations in the islands to visit other places, either inside or outside the Pacific, to learn more of each other's work.

In 1958 the Commission was able to pay part of the costs incurred by women's organizations in Fiji, Western Samoa, and the United States Trust Territory in sending delegates to the Eighth Conference of the Pan-Pacific and South-East Asia Women's Association held in Tokyo, and further financial help for travel is available in 1959.

U.S. Women's Organization Offers Help

But as mentioned before, the voices of the Conference and the Research Council are heard still further afield. Commissioners are often in a position to bring their views about the needs of the Pacific to the notice of other people besides governments.

Just before the meeting of the seventeenth (1957) session of the Commission it was learned that United Church Women, an organization of women of the co-operating communions of the National Council of Churches of Christ in the United States of America, had been so impressed by what they had learned through the United States Commissioners about the needs of the women's organizations in the Pacific that they wished to assist by offering a substantial financial grant that work in this field might move forward.

The United Church Women's offer was to provide funds for the services of an experienced and highly-qualified woman to conduct a project with women's groups in one or two territories for a period of two years. This extremely generous offer was one which, in modern parlance, had no strings attached to it.

During "South Pacific Night" Ma'aola Lam Sam from Apia, Western Samoa, presented gifts from Samoan women to United Church Women. Miss Lam Sam is studying in the field of social welfare in the United States.

The organization simply wished to express its interest in the request, made by the women themselves, that ways be found to help them to exchange information and establish channels through which they could work together.

This offer was received on the eve of the Commission's seventeenth session, at which the very question of an appointment of a women's officer was to be discussed.

The Commission realized that the matter could not be properly dealt with in a few minutes round a table. Practical objectives for the project would have to be drawn up; the question of a territory in which it could be established would have to be decided; and an appropriate officer would have to be found and appointed. None of these things could be decided just arbitrarily by the Commission. Territorial administrations, metropolitan governments, and the United Church Women would all be concerned and would have to be consulted.

Five Practical Steps

However, the Commission did immediately take five very practical steps: (i) it gratefully accepted the United Church Women's offer; (ii) it made considerable additional financial provision of its own to support the offer and to take care of related matters until the project could be established; (iii) it requested the next Research Council meeting to give special attention to the proposals and to draw up a plan of action; (iv) it invited Miss Freda Gwilliam, Woman Educational Adviser in the United Kingdom Colonial Office, to attend the next Research Council meeting as a consultant, having in mind her vast experience of different aspects of women's work all over the world; and (v) it provided further funds to help representatives of women's organizations in the islands to visit similar organizations elsewhere.

Following this session, detailed working papers were prepared for the consideration of the next meeting of the Research Council at which the whole proposal was thoroughly considered.

The Research Council's discussions were of the highest quality, tempered by the down-to-earth realism to be expected from members. Each of the territorial members was a senior officer with long experience of Pacific territories; and the two consultants, Miss Freda Gwilliam and Professor Horace Belshaw, brought unique experience to the meeting.

Miss Gwilliam has long and intimate experience of work done to assist the progress of women in every continent. Professor Belshaw is internationally known as an economist, as former Chief of the Rural Welfare Division of the Food and Agriculture Organization, and as Chairman of the United Nations Mission which surveyed community development in Africa, as well as for his work in the Pacific.

Major Roles Of Women

Miss Gwilliam analysed for the Council the three major rôles of women in society, namely their rôle in the home; their rôle in public life and service of the community, and their rôle as economically independent personalities. She emphasized women's rôle as complementary to men rather than competitive with them. Miss Gwilliam then showed how the emergence of women in these rôles

(Continued on page 64)

Life is simple and carefree in

The Wallis And Futuna Islands

Lying roughly in the middle of the Pacific Ocean, between Fiji and the Samoas, are the Wallis and Futuna Islands. This article on them is of topical interest because later this month this tiny French protectorate will for the first time send delegates to a South Pacific Conference. The fourth of these regional meetings, which are held every three years under Commission auspices, will open in Rabaul on April 29.

Wallisian women making a tapa, a decorative hanging made from the inner bark of the mulberry tree, and painted with a variety of designs.

LYING roughly in the middle of the South Pacific Ocean between Fiji and Samoa is Wallis Island, on longitude 176.35° west and latitude 13.2° south. Some 120 miles to the south-west is Futuna Island, with smaller Alofi Island close by.

WALLIS

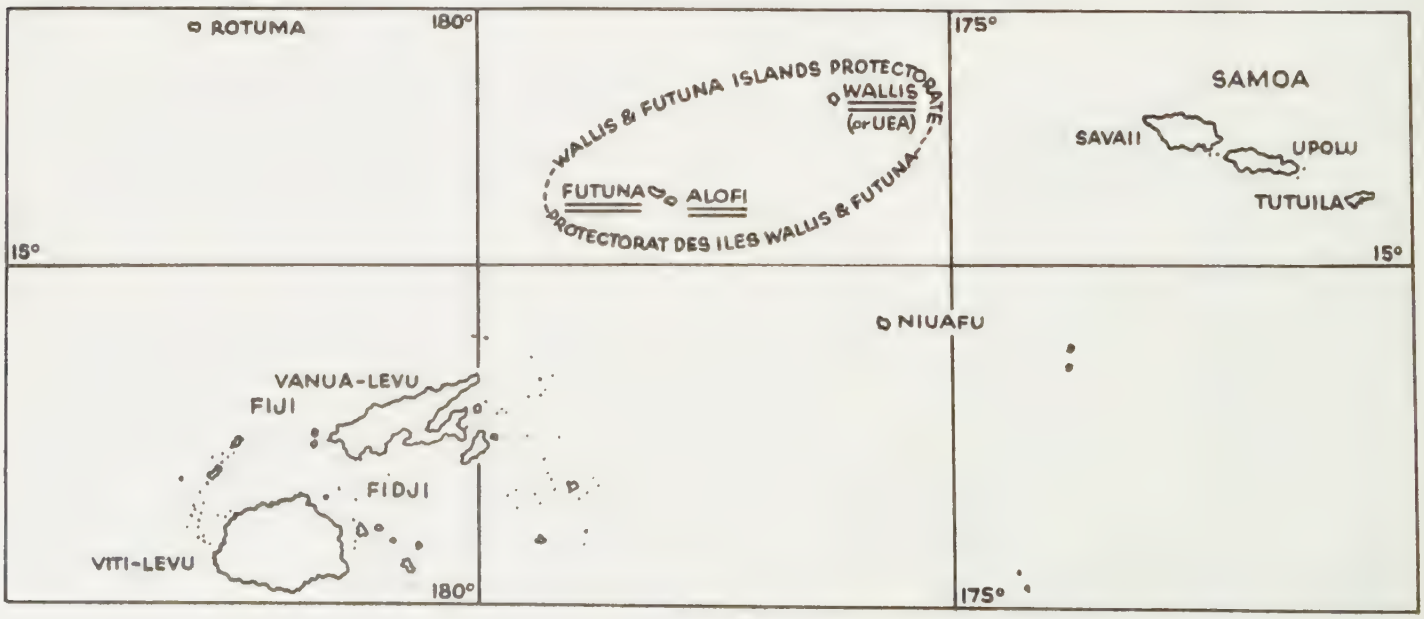
The group was discovered in 1767 by Captain Wallis who circumnavigated, and drew a rough map of the main island, to which he gave his name.

Seventy years later, when the Marist Fathers founded a missionary society in Lyons for evangelizing the natives of Western Polynesia and Melanesia, they sent a mission to Wallis. The first French missionary, Father Bataillon, soon became very influential with the Chief of the island, and on November 4, 1842, the latter signed a document placing himself under the protection of Louis-Philippe, King of France. This act was completed on November 19, 1886, by a protectorate treaty which was ratified by a decree dated April 15, 1887.

Wallis Island—Uvea in the language of its people—is of volcanic origin, but its contours are so eroded that the highest point is only 420 feet. It is about ten miles long by five wide, and is surrounded by a coral reef from one to three hundred yards wide, which acts as a natural breakwater and protects the coastline from the deep Pacific swell.

The reef is about two to three miles off shore, the only entrance to the lagoon navigable by ships being the Honikulu Pass. Even so, the operation is hazardous, and ships can only enter in slack water at low tide because of the strong current during the ebb and flow.

On the east side of the island there are several uninhabited islets within the lagoon. Wallis has no rivers, and for water the people depend on rain and springs along the beaches. In spite of this the island is fertile and pleasant,



Above and centre: Wallisian youth in dancing dress. Right (top to bottom): The Bulu i Uvea (Minister of Justice) of Wallis. Hihifo Church. Mission school for boys at Mata-Utu. Wallisian children.

especially on the east coast, where one finds many dwellings.

The climate is hot and damp all the year round, and one hardly notices that there is, in fact, a slight drop in temperature—from 88° to 83° C—between July and September.

A Polynesian People

The Wallisian is of the Polynesian race which also peoples the islands of Tonga, Tahiti, the Marquesas and Leeward Groups. The Maoris, who flourish today in New Zealand, form another branch.

Because of its isolation the local population has retained the pure features of the Polynesian. Generally speaking the men are tall and strong, with a golden complexion and slightly wavy hair. Their profile is bold and characteristic of a proud race.

The women are not so well endowed. Smaller in stature, they err on the heavy side, with broad shoulders and a massive face. They wear their hair long, often plaited into elaborate styles.

The Wallisians lead a simple life, and a carefree outlook has long been their main characteristic. A likeable people, they avoid complications in their mode of life, and because conditions have not encouraged evolution towards modern standards, until the last few years they remained very close to the primitive.

The men take care of the necessary subsistence crops, the fishing, and assume the heavier duties. while the women attend to domestic duties and the raising of their many children. They also weave pandanus mats and make the well-known "tapas", a kind of hanging worked from the inner bark of the mulberry tree.

Protectorate Still A Kingdom

This small protectorate has retained its own rules and customs, and remains under the leadership of a king or a queen, the *lavelua,* who is assisted by an assembly of notables called the "Grand Fono". All decisions are made by the "Grand Fono", headed by the *lavelua* with the assistance of the French Resident, who lives in Mata-Utu, the main village of the island.

The population has been converted to Christianity entirely by the Marist mission, which is now in charge of education.

The French Administration has established a hospital in the main village of Mata-Utu and a network of dispensaries throughout the island. It is also in charge of all public services, post office, radio, telecommunications, roads, public health, etc. The local budget, income and expenditure, is balanced at 45,000,000 francs through a metropolitan subsidy, amounting to 90% of the income.

Wallis and Futuna Islands receive assistance from FIDES* for the purpose of improving basic social and economic facilities. In 1958, a large sum of money was granted to improve the wharf and the road network, and erect new hospital buildings in both islands.

During the last war, 5,000 American soldiers were stationed in the islands from 1942 to 1945, during which time they built two airfields and set up two seaplane bases. The airfield at Hihifo in the north of Wallis Island is still capable of carrying DC-3 or even DC-4 type planes. Since 1957, the airline, *Transports Aèriens Intercontinentaux* (TAI) operates a monthly flight by DC-3 from Noumea via Nadi, and a ship calls at the islands three times a year, bringing supplies and loading copra.

Efforts To Improve Economy

Although Wallis is a fertile island the economy has remained very primitive,

A metropolitan fund for the social and economic development of French overseas territories.

East coast of Wallis Island. The islets, which are within the lagoon, are uninhabited.

perhaps due to isolation, or maybe because of the distinctive temperament of the inhabitants.

Before the war, most of the income of the island was derived from the coconut plantations, but they are now ravaged by the rhinoceros beetle. Efforts are being made to control the pest, and also to introduce new crops such as cocoa and coffee.

During the last few years the main income of the island has been derived from the work of approximately 1,000 of the 7,000 inhabitants, who went to New Caledonia and the New Hebrides to work in the mines, on plantations, the docks, etc.

This revenue has dwindled recently due to the mining recession in New Caledonia which has put many Wallisians out of work. Some are going to the New Hebrides to find work on plantations.

Air transport may, of course, open up a small tourist trade for the island. Its people are hospitable, and their culture is rich in colourful traditional ceremonies such as dancing and kava drinking.

Wallisian handcrafts have been encouraged by the Marist Sisters, and this may prove to be a supplementary source of income, as some of the products (tapas, feather-trimmed fans, grass skirts, baskets, hand-woven table mats) are quite outstanding.

FUTUNA AND ALOFI

Rugged and picturesque, Futuna and the neighbouring island of Alofi are very different from Wallis.

When landing in Futuna, the traveller discovers beautiful green mountain chains and rounded peaks, often shrouded in clouds, and enclosing deep valleys in which streams flow. The villages are mostly strung along the shore on the narrow coastal plain.

The highest point (2345 feet) is called Mount Singavi or Schouten, after the Dutch explorer who discovered the island in 1616. Futuna, some ten miles by three, is the only inhabited island of the two. Alofi, separated from Futuna by a channel about three miles wide, is used only for fishing and growing crops. Apparently no one has settled there because of the lack of water.

Physically, and in their customs, the inhabitants of Futuna are very much more primitive than the Wallisians. Numbering approximately 3,000, they are divided into two administrative groups, one governed by the King of Singave, and the other by the King of Alo.

When Father Chanel, the first Marist missionary, landed on the island in 1837, there was a continuous state of war between the two tribes. Life was even harder for Father Chanel than for the missionaries on Wallis, as he lived under a continuous strain, due to the hostility of some of the inhabitants. He nevertheless believed that he would succeed in his mission, but was eventually killed. Canonisation came for him in 1955.

In spite of harsher circumstances, the inhabitants of Futuna manage to produce 800 to 1000 tons of copra a year. This production, together with a few tons of trochus and copra from Wallis, is collected in New Caledonia for dispatch to France. The Futunians also emigrate to New Caledonia and the New Hebrides to try and increase their meagre income.

Close Link With Past

These Polynesians are reminiscent of the South American Indians, and form perhaps, one of the closest links with the past. It would be interesting to study their history before they are caught up in the maelstrom of modern life where, as they are smelted within a vaster crucible, they will lose their ancestral customs and assume a way of life which, although easier in some respects, will certainly not be so carefree.

Above: The beach at Mata-Utu, with administrative post in background and Royal palace on right. Right: Typical Wallisian scene.

Flowers and fruit of the pomelo, which was introduced into Tahiti from Borneo forty years ago.

Tahitian Pomelo An Introduction From Borneo

By J. Boubee and J. Barrau*

AN excellent variety of pomelo, *Citrus grandis* (*C. aurantium*, var. *grandis*, *C. decumana*, *C. maxima*), is now commonly grown in Tahiti, where its big, sweet and juicy fruits are eaten daily in large quantities.

This citrus was introduced by the late Harrison W. Smith in Tahiti's beautiful botanical garden at Motuovini, in the district of Papeari. Many territories in the South Pacific have already introduced this pomelo variety from Tahiti, including the Cook Islands, New Caledonia, the New Hebrides and Samoa. Propagation material has also been sent to Australia, Cuba, New Zealand and the United States.

The fruit, which can travel for weeks in excellent condition, is now exported from French Polynesia in small quantities (amounting to about 50 tons in 1957).

The story of the discovery of this citrus variety and of its acclimatization in Tahiti is a fascinating one, and an excellent example of the great value of plant exploration and introduction.

In 1919, as a passenger on board a small, old, tramp steamer, Harrison Smith was sailing along the coast of Borneo—more exactly, of Sarawak. The Hadj Djeman, skipper of the tramp, who badly needed a hair-cut, asked the plant explorer to lend him his brand new American hair clippers. Unfortunately the crew member acting as barber did not know how to use them, and Harrison Smith had to cut the skipper's hair.

The following morning the steamer called at Marudi on the Baram River. Later in the day the skipper, wishing to thank Smith for his performance with the clippers, sent him a basket full of large, delicious pomelos from a local garden that he owned.

Smith realized immediately the value of this variety—by far the best of the pomelos—and sent a few seeds to Dr. Williams, then British Consul in Papeete. When two years later he returned to Tahiti, Williams gave him three seedlings grown from the seeds sent from Sarawak. Only one survived, and it was used for propagation.

In 1930 the first fruits were picked and found as good as those the Hadj Djeman had given Harrison Smith ten years earlier.

Then Smith undertook a lengthy and careful work of selection and improvement. Budding and marcottage were mostly used to propagate the best type of fruits. The aim, which was achieved, was to obtain a pomelo with an almost seedless, sweeter and bigger fruit.

Unfortunately, large size is not a desirable characteristic as far as export is concerned, and the fruits of the Tahitian pomelo are found generally too big by fruit traders outside Tahiti. However, anyone wanting to use this pomelo as a cash crop for export could rectify this drawback by carrying out further selection work.

* M. Boubèe is an officer of the Department of Agriculture and Forestry, French Polynesia. Dr. Barrau is Plant Introduction Officer, South Pacific Commission.

Crayfish Industry Proposed For Fiji

A United States company estimates its home market could absorb over 1,000,000 lbs. of crayfish meat annually from Fiji. Recent experiments have shown that crayfish can be taken there successfully in pots and traps.*

The company, which will send an expert to Fiji shortly for further investigations, has offered to advance capital for equipment to teach the Fijian people modern methods of catching and processing crayfish.

* It is a curious fact that though crayfish abound in the reef waters around New Caledonia and neighbouring islands, all efforts to take them in baited pots and traps have failed.—Editor.

Sales Promotion Campaign For Pearl Shell

Paris fashion designer Pierre Balmain will arrive in Australia in April on a four-week visit to introduce his collection of spring fashions featuring the "pearly look".

His visit is being sponsored by the Commonwealth Government and the Australian pearl shell industry as part of a world campaign to promote sales of pearl shell products, and to counter the threat to the industry from synthetic imitations.

The campaign, which will feature the natural beauty and prestige appeal of genuine pearl shell, should materially benefit not only the Australian producer but all those engaged in the industry throughout the Pacific.

Above: A catch of "ika droka", a type of freshwater perch that can be taken in most streams and rivers in Fiji. The largest of these weighed about 2½ pounds. They will take spinners, fresh bait or insects, and flies; and are a "natural" for spin fishermen. Right: The Navua River in Fiji, where most of the "ika droka" shown alongside were taken on spin-fishing gear.

Spin-Fishing For The Island Angler

Amateur fishermen in the Pacific islands will find spin-fishing a fascinating and highly effective way of taking fish, both from river and sea. This article by a leading Fiji angler describes the gear needed, and how it is used.

By ROB WRIGHT*

THE phenomenal growth in the popularity of spin-fishing started early after the cessation of hostilities in World War II, yet in this comparatively short time it has eclipsed all other types of fishing that have been developed over centuries.

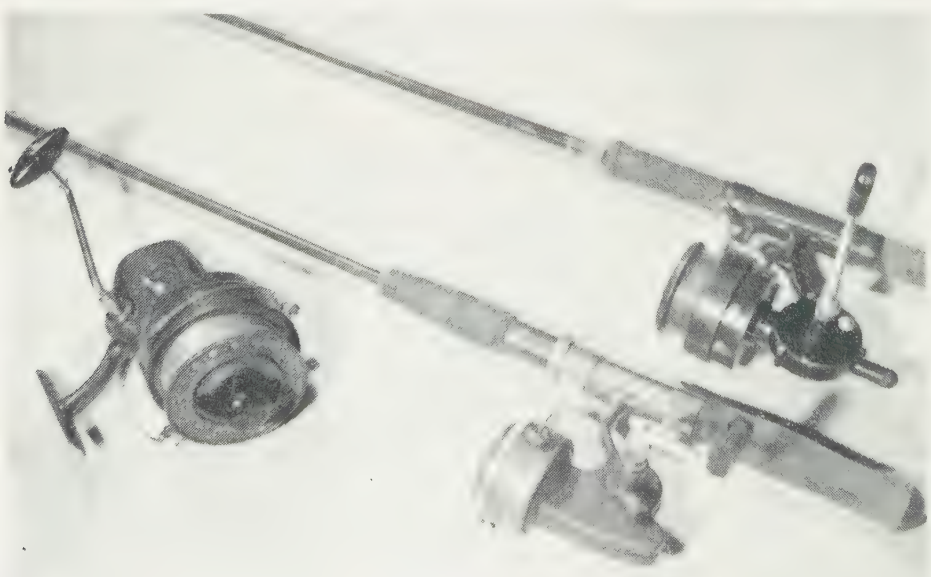
Because of this we are apt to consider spinning to be a relatively new adjunct to sport-fishing. This, however, is not the case. The Pacific Coast Indians of the North American continent actually used a frame attachment to hold lines and cast from it by the spinning principle. A century or more ago, a type of fixed-spool reel was in use in Europe. This was used in conjunction with thread from textile mills, thereby earning the expression "threadlining"—a name by which this type of angling is known in British countries today.

Many variations of this principle were tried in European countries before Alfred Illingworth, an Englishman, in 1905 made the first workable spinning reel based on the fixed-spool principle. It became extremely popular in France, Switzerland, and many other countries. At one time it was actually banned from use in British rivers and streams because it was considered too deadly.

When Illingworth's patent ran out the boom in spinning reels really began, and improvement followed improvement until the fixed-spool reel reached today's perfection. Bache Brown introduced the reel to America as late as 1935, and after overcoming some early prejudices, that country welcomed it with open arms.

Coupled with the fantastic popularity

*Mr. Wright, who is the official photographer attached to the Public Relations Office in Fiji, also conducts a popular Saturday feature for amateur fishermen in the *Fiji Times* entitled HOOK, LINE AND SINKER.



Two types of spinning reel and rod seat are shown alongside. The bottom reel features a bail pick-up, the rod a permanent reel seat. The top reel has a finger pick-up, and the rod a sliding ferrule seat. The reel at left is a large salt-water spinning reel for medium to large game-fish.

The lures in the top row—with the exception of the two at the right end, which are home-made—were manufactured by the well-known Gibbs factory in Canada. The bottom row are Swedish lures. In the centre are swivel snaps which facilitate changing baits.

of the spinning reel has been the equally fantastic development of monofilament lines of nylon. Singly, it is doubtful if one or the other would have attained the heights they have reached today, but together—they are as inseparable as "ham and eggs".

The acceptance of this fishing method by a fishing-minded public is easily explained because the tackle can be mastered in a relatively short time.

A Different Action

The basic difference between a conventional reel and a spinning reel is that the latter has a fixed spool which does not revolve when casting. The conventional reel does, and the thumb or some mechanical gadget must be employed to keep it under control. If it goes too fast, the line doesn't leave the spool to keep pace, and a "backlash" with a tangle results.

This doesn't happen with a spinning reel, and that is why it is so different from other methods. As the reel spool does not revolve, the line simply spins off the open face. In this way it is possible to cast almost any lure from the lightest to the heaviest without getting a backlash. A beginner can make long casts in a fraction of the time it would take to accomplish the same distance with a revolving reel. It is the simplest method of casting to teach women and children; is ideal for the "occasional" fisherman who can't put in long hours of practice, and finally it offers a real challenge to the expert in catching very large fish on very light lines.

One of the important advantages of spin-fishing is the fact that very light lines are used—generally between four to ten pounds breaking strain. With these it is possible to drop a tiny spinner or plug sixty or seventy feet away without any effort, and with the line and lure under complete control. The line is so fine there is practically no drag from the current, and the lure is so small there is hardly a splash as it enters the water.

Had it not been for the development of monofilament lines and properly-balanced lures, spinning may still have had some problems, but the sleek single strand of almost invisible line has taken the last snarl out of fixed-spool casting, so that the newcomer can perform very creditably with but a minimum of practice.

Spinning A Highly-Adaptable Method

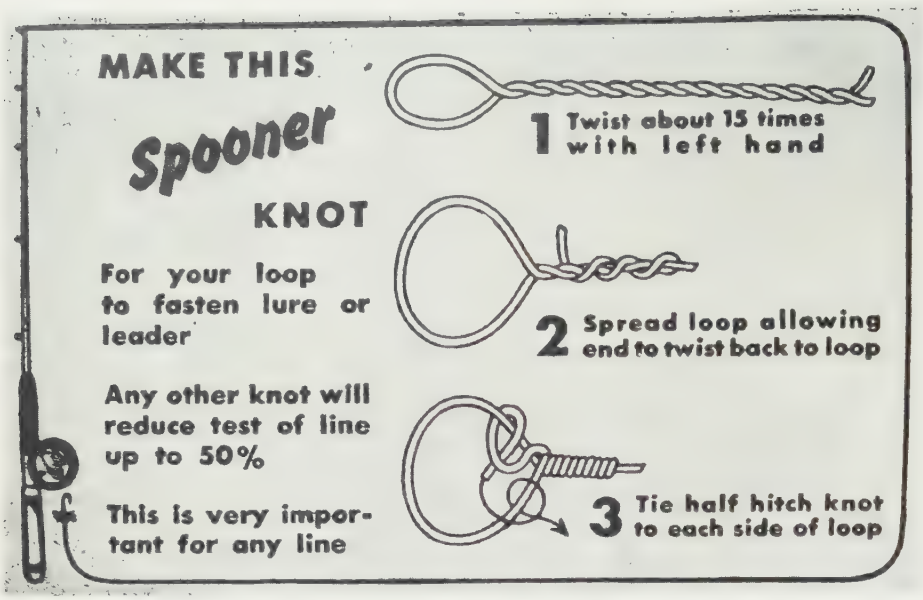
Spinning can be adapted to any kind of angling. An angler can take one rod, one reel, a few lines and an assortment of lures, and go off to either stream or ocean, content with the knowledge that the tackle will catch him fish.

Almost all spinning reels have interchangeable spools which can be taken off and put on in a matter of seconds. With three or four spools and with different weights of line on each, it is possible to cast a complete variety of jigs, spoons, plugs, spinners, live bait, and even flies.

Since the fixed-spool reel has a slipping clutch adjustable to the breaking strain of the line, playing a fish becomes a matter of ordinary procedure, and there's the extra dividend of fighting a fish on light rod and line which provides the maximum in thrills, fun, and sport. Every strike, every run, leap, lunge, and movement is telegraphed down the sensitive rod to the delight of the angler.

Initially developed for fishing in freshwater streams and rivers—which it has done with phenomenal success—the

A small ball-peen hammer and a lead block are used to fashion the home-made lures at left. Treble hooks and split rings complete the spinners. They may be made from damaged headlight rims, or beaten out of brass or copper.


MAKE THIS
Spooner
KNOT
For your loop to fasten lure or leader
Any other knot will reduce test of line up to 50%
This is very important for any line
1 Twist about 15 times with left hand
2 Spread loop allowing end to twist back to loop
3 Tie half hitch knot to each side of loop

spinning outfit has invaded the salt water, and rods and reels have been adapted for this purpose. Most of the latter are now made of corrosion-proof metals and are capable of giving long and good service.

The Spinning Reel

Let's look closer at this tackle. The average spinning reel for salt water use weighs between 11 and 16 ounces. Since the angler in the Pacific is more concerned with the sea than with fresh water, it is suggested that he concentrate on this type of reel. The average spool capacity would be between 250-300 yards of 8-9 lb. line.

The body, generally, is made of some light-weight cast metal which encloses a simple but efficient set of gears. At the front end is the drag mechanism operated by a wing-nut which exerts pressure on the line spool. The spool itself resembles a super-sized sewing machine bobbin. Enclosing this on all sides but the front is a metal cylinder which, when activated by the crank handle, revolves around the spool like a flywheel. Attached to the edge of this flywheel is a pick-up arm or bail. The bail is fixed diagonally across the flywheel so that it falls almost in the centre of the spool. It works on bearings at both ends so that it may be flicked forward to open the spool or—with a touch of the crank—flicked back to close the spool. At one end of the bail is a line guide or roller of hardened steel or agate.

The dominant feature of this open-face reel is that the axis is parallel to the rod and not at right angles to it as with conventional reels. Another big difference between this and other reels is that the spin reel is fitted below the rod, while conventional reels are attached above it.

The spin reel usually comes with the crank handle on the left side, which may seem awkward and strange at first, especially if the angler is right-handed, but this inconvenience disappears in a short time. The big advantage in left-hand reeling is that there is no changing hands after casting. The right hand carries the rod and reel, and does the casting, hooking, and playing of the fish. The left hand simply winds the crank handle.

Drag A Vital Part

Another feature which makes the spinning reel different is the friction clutch, or drag. This mechanical device enables the fish to take out line under steady tension, permitting the angler to handle the fish more easily and tire it out sooner. Drags vary somewhat in construction but most of them exert pressure on the reel spool, and the amount of pressure may be adjusted by tightening or loosening a wing-nut in front of the spool.

Because of the light lines used in spinning, the drag is a vital part of the spinning reel. When a fish is hooked and takes off in a run, a good drag enables it to do so without placing too much strain on the line, so an all-important consideration in choosing a reel is to make sure the drag is smooth. Some drags are inclined to slip slightly and then bind, resulting in a jerking motion on the line.

Another useful device is the anti-reverse lock. When this is slipped to the "on" position it prevents the handle from turning backwards. It should, however, be left off until a fish is hooked, otherwise the pawl may wear. This, then, covers a description of the spinning reel, so we'll now look at the other half of the outfit—the spinning rod.

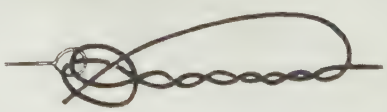
The Spinning Rod

Rods are made from tubular glass, solid glass, split bamboo, and steel. They vary in length between six and eight feet, and have actions between light, medium, and heavy. Most rods look alike and it is difficult to separate the poor quality from the good. Here is where the reputation of the rod manufacturer comes in. A product from a good manufacturer will be more expensive, but will pay dividends in the end.

For the angler in the islands, a good quality tubular glass rod of about 6'6" with medium action is recommended. This will stand up to the vagaries of the heat and humidity with which the fisherman in this part of the world must contend. Solid glass rods are cheaper in price but tend to be top-heavy and slow in action, and there is always the consideration of extra weight.

DOUBLE CLINCH

The clinch with two loops through the eyelet is the same as the simple clinch, except that an extra loop is made through the eye of the hook before the strands are twisted. The free end is run through the extra loop as well as through the space formed by the first twist of the two strands.

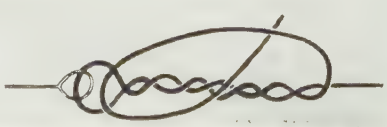


CLINCH ON SHANK

The clinch knot on the shank is the simple clinch knot tied so that the entire knot is inside the eye and the holding part of the knot is around the shank instead of in the eye of the hook. This knot provides "straight pull" for those who believe it to be important.

PENDRE

The Pendre knot is a variation of the Pendre dropper knot; it is merely a clinch knot with the free end tucked through the space between the single strand and the twisted strands.



Mangrove creeks are ideal spinning spots, and provide a variety of good pan fish for the spin fisherman.

The handle, or butt, of the rod is made of cork, which should be firm and not pitted. The cork handle is generally about 12″-14″ long, and on this are fitted ferrules for attaching the reel. On the average rod, the reels and ferrules may be moved up or down on the cork handle so as to attain the best balance for the angler. Some rods, however, have permanent reel seats made of anodised aluminium or chrome steel.

The guides of the rod, which should be made from stainless steel or heavily-chromed brass, are placed strategically along the rod length so that when a fish is being played the bend of the rod extends all the way from tip to butt in what is usually termed a parabolic curve. The guides should graduate in size from a large butt guide near the handle to progressively smaller guides near the tip. This is important when using open-face reels, as it permits the spiralling line to pass through them without drag and keeps the wet line away from the rod lest friction impair the cast. Now to the accessories.

Lines And Lures

There are many makes of lines to choose from, and for average salt-water use an eight- or nine-pound test monofilament is perhaps the best bet. Since the line may become twisted when first placing it on the spool, some care is necessary in this operation.

If the line is purchased on plastic spools, fasten the end to the reel with an ordinary clinch knot and pull it up slowly and tight. Slip a pencil or something similar through the centre of the plastic spools and, having threaded the line through the rod guides, begin winding on to the reel, keeping a tension on the line with the right hand. This will also indicate how the reel works.

When the bail picks up the line it slides it into the line roller or guide, and, as the handle is cranked, the line is laid neatly into the reel spool. Continue this operation until the spooled line reaches to within $\frac{1}{8}$″ from the lip. This should be the maximum amount required; any more may cause trouble by spilling off the open face and causing tangles.

There are dozens of different types of spinning lures for the angler to choose from. There are wobblers, plugs, spinners, spoons, jigs, and a host of others in various weights, sizes, colours, shapes, and actions. A particular type of lure in one territory may not be successful in another, so it is a matter of personal choice. For average use, choose lures ranging between $\frac{1}{4}$ oz. and 1 oz. If heavier, they may place too much strain on rod and line, with perhaps a snap-off when casting.

There are various types of snaps, swivels, and other connections which simplify the changing of lures, but the less hardware used in spinning usually produces better results. However, there are times when it is not possible to avoid using terminal tackle of some type. For instance, when spinning into the sea, sharp-toothed barracouda and needlefish will cut the line in a flash, if a wire trace is not used. Six or eight inches of very fine wire is a wise precaution.

Now, to look at how the rod and reel function together. Attach the reel to the reel seat, making certain that the reel foot is lined up with the rod guides. Open the bail until it clicks back and is held by a stop. Take the end of the line from the spool and thread it through the guides, pulling enough from it to reach the handle, and then close the bail with a short turn of the crank.

As the first section of line takes the brunt of the fight and may come into contact with the fish, it is best to double this for about 12″-14″ by the use of a double thumb knot or a Spooner knot. To the end of this double line, attach the swivel snap and lure with trace.

Tension the reel by pulling off line against the drag with your hand, adjusting the wing-nut to give you greater or less pressure. Do NOT put too much tension on. It is better to give the fish its head for a while than to have a break-off immediately. Allow the lure to hang about 6″ from the rod tip, and reverse the handle of the reel until the roller of the bail comes to the top. Scoop the line up with the index finger of the right hand and at the same time open the bail with the left. All is now ready for the cast.

How To Cast

Point the rod horizontally at the target, then lift it sharply to a one o'clock position behind the head, at the same time keeping the elbow to the side. Without pausing, snap the wrist forward and, as the rod reaches the eleven o'clock position in front, arrest the action and open the forefinger to release the line. The lure will sail out like a bullet to the spot originally aimed at.

Retrieving is purely automatic—a matter of turning the crank handle. Keep the tip pointed at the lure to prevent excessive line wear. If a fish strikes, hook it firmly by flicking the rod tip upwards, throw the anti-reverse to the "on" position, and then raise the rod to a comfortable position to play it. It's as simple as that.

The retrieve may be fast or slow (the reels are geared high) and added motion may be imparted to the lure by manipulating the rod tip—jerking it slightly or swinging it side to side.

The axiom—"practice makes perfect"—may be applied to spin-fishing as with other things, but here are a few tips for the Pacific angler. Stay away from coral areas until proficient with the gear. Inspect the first few feet of line after a few fishing expeditions and, if frayed, pull it off and throw away. Don't alter the reel tension once a fish is on. Shallow water will often produce lunkers. Try spinning around mangroves and mangrove creeks. Don't monkey with the rod and reel if it is working well. Wash and wipe them dry before putting away. Wash lures in fresh water and dip hooks in oil.

The newer closed-face spin reels and the large salt-water reels for surf fishing have not been dealt with in this article, but the principle differs very little from that described here.

Participants who attended the Health Education Training Course held recently in Guam. They were from Saipan, Rota, Truk, Ponape, Marshall Islands, Palau, Yap and Guam, and included medical practitioners, sanitarians, nurses, teachers and community development officers. Mr. L. W. Cowper, Course Director, is on the extreme right, while at centre rear is Mr. Lynford Keyes, Course Adviser. Mr. Keyes is WHO regional adviser for health education of the public, with headquarters at Manila.

Health Education Training Course In Guam

From October 27 to November 21 last, 37 Micronesian trainees attended a health education training course in Guam. This report on the Course was contributed by the Director . . .

LAWRENCE T. COWPER*

"WHAT you have learned and observed at this Course from each other and from the staff is now your individual responsibility to put into practice as best you know how in your home districts, working co-operatively together with the people of your area towards better health."

This challenging statement reflects the general trend of the address given by Mr. D. H. Nucker, High Commissioner of the Trust Territory of the Pacific Islands, at the closing ceremony of a four-week health education training course held from October 27 to November 21 last in Guam, under the sponsorship of the Government of Guam, the Trust Territory of the Pacific Islands, and the United States Navy (Saipan District).

For four weeks, 37 selected Micronesian sanitarians, nurses, medical practitioners, teachers, and community development officers from Guam, Saipan, Truk, Ponape, Yap, Palau, Rota, and the Marshall Islands, had been working and sharing together their ideas. Now the training course was over, and many would begin their long travel homeward, to face once again the health problems of their areas. Where the participants had come together as strangers, they were now departing as friends, and with a new respect and outlook on health in their own areas, and for their people and themselves.

Origin And Planning

A year before the closing date of the Course, almost to the day, the three major agencies involved had agreed one should be held. In that year a great deal of work and planning had been carried out in close co-operation by a great number of people to make the Course a reality.

The original proposals for the Course came from the health and education administrators of the three participating agencies after five selected Micronesian health workers from these territories had returned from the SPC-WHO Health Education Training Course held in Noumea, New Caledonia, in July-August of 1957. The productive work in health education enthusiastically carried out by these participants upon their return convinced the administrations of the importance and need for a similar training experience for other Micronesian members of their staffs.

A meeting was held in December of 1957, with all the interested agencies represented to discuss possibilities. The WHO Regional Adviser in Health Education, Mr. Lynford Keyes, who was visiting the Trust Territory at the time, gave his comments and ideas. The discussion ended with the acceptance of a general plan for a Course with myself as director and organizer.

The Guam Tuberculosis and Health Association, a volunteer health agency, was approached for assistance, and after studying the general plan, the Board of Directors voted the sum of $5,000 towards expenses.

By June, 1958, most of the basic Course documents had been prepared, and selection of the staff had begun.

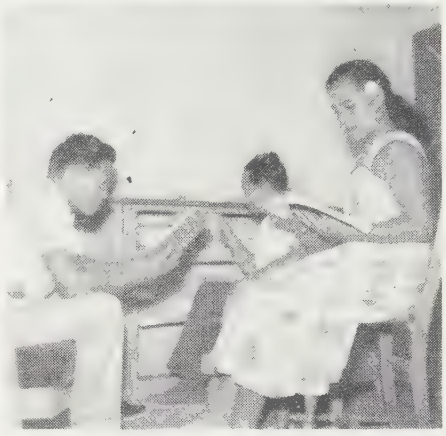
The Regional Office of the World Health Organization in Manila made their regional adviser for health education available in August for an advance review of preparations, and later during the Course period as Course Adviser.

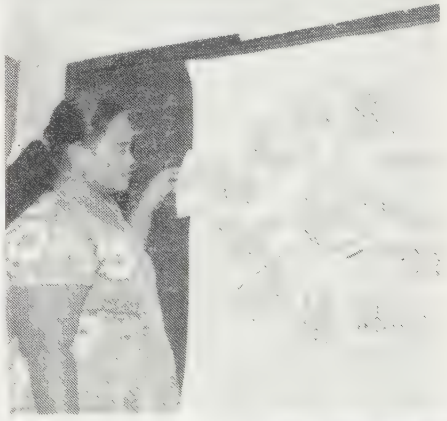
The Trust Territory of the Pacific Islands contributed as staff members, an anthropologist from Ponape, a hospital administrator from the Marshalls, the Director of Sanitation, the Director of Education, and a teacher trainer from Truk.

The Government of Guam, in addition to providing the Course Director, also contributed the services of the chief public health nurse from Guam, who had attended the SPC-WHO Health Education Training Course.

Negotiations by the Government of Guam with the International Co-operation Administration Mission to the

* Chief, Sanitation Section, Government of Guam.





Above: Use of "buzz groups" to evaluate topic summaries in general sessions brought out important points. Centre: The study topic groups formed the nucleus of the Health Education Training Course. Above right: The report-back sessions frequently used role-playing or socio-drama as a means to develop the summary presentations. Right: This library was specially installed for the Course. Below, centre: Dominina Fitial of Saipan works with a flannelgraph developed at the Course for the study topic, "planning and organization of health activities and programmes." Bottom: Volley ball at a picnic area was a popular sport during the Course.

Philippines resulted in that agency supplying a professional health educator. This completed the staffing.

Both the Trust Territory of the Pacific Islands and the Government of Guam made available resource people from their education and medical departments as needed.

Arrangements were also completed in June with the Navy for using the civil service facilities at Camp Asan to accommodate the Training Course as well as to provide study group rooms, library, recreation and office facilities.

During June and July, Course documents describing the type of training which would be presented, the accommodations, the financial responsibilities, and other aspects of the Course were forwarded to the various district administrators, education administrators, and district directors of public health in the Trust Territory, Guam, and Saipan for their consideration.

Each participating agency under the general plan agreed to accept responsibility for the transportation of its trainees and staff to the Course.

Pre-Course District Conferences

The organizers of the Course believed that in order to familiarize the people of the districts with its purposes, and at the same time determine the health education problems and interest of the people in the various districts, pre-Course district conferences should be held. In addition to the local selected trainees and staff, local leaders, interested lay people, and administrators from both the education and medical departments attended these meetings.

It was agreed later in staff discussions that these district meetings were very important in explaining the purpose of the Course. Each trainee, after participating in them, submitted to the Course Director an assignment which had been previously sent out to him. For the information received at the pre-Course district conferences and the trainee assignments, the staff, during its meetings a week before the Course, was able to develop the four major study topic areas for the latter.

Final Staff Planning

A week before the trainees arrived the staff members gathered at Camp Asan to plan details of the Course. The staff used this week to establish itself as a group, to clarify Course aims and objectives, to decide on the major Course policies and procedures, and to decide the assignments and responsibilities for each staff member.

The schedule for the first week was carefully planned and prepared for distribution, and a tentative list of study topics for the entire Course was drawn up. Throughout the latter, the staff met regularly to consider the overall needs and to make recommendations to the planning council.

Conduct of the Course

Following the formal opening ceremony on October 27 at the Club Breakers, Camp Asan, where Governor Lowe welcomed participants on behalf of the Government of Guam, trainees met staff members in seven small advisory groups to receive general orientation regarding the Course, the facilities and what the forthcoming four weeks held in store. These advisory groups were maintained during the Course to assist trainees with problems.

The study programme of the Course opened when trainees and staff were divided into four temporary multi-disciplinary groups to discuss and list the health and health education problems of their home districts, and the related interests of trainees. Five sessions were

given to this problem finding, and then the compiled findings of the four groups were distributed to the Course membership and a summary of the problems presented as a panel discussion at a general session. Throughout the Course, this compiled list of problems was useful to the staff and the planning council in the development of the Course content.

Following the report-back session on the problem-finding groups, four permanent study groups were organized to deal with the main study topics of the Course. These were established by the staff, and the membership of each study group was balanced according to different catagories of workers, sex, geographical distribution, and educational background. At least two staff members were a part of each group.

These study groups remained the same throughout the Course in order to provide the trainees with an opportunity to study and experience how small groups interact and grow in effectiveness. Study groups usually met for two periods in the morning. An effort was made in each to evaluate not only progress, but also its group behaviour.

The Programme

Four study topics were covered during the Course which were focused on village life. They were:

(i) Finding the health needs and problems in the village;

(ii) how the health of the village is influenced;

(iii) how changes are brought about in village life;

(iv) planning and organizing health education activities and programmes.

Four staff members and four trainees —one of the latter selected from each study group — formed the Planning Council. The responsibility of this group was to plan the programme of study in terms of the problems and interests of all the trainees. This group considered the study topics proposed by the staff, determined the length of time to be spent on each topic, and its method of presentation and summarization. Co-ordinating the Course committees' reports and activities as well as selecting the staff member to organize the plenary sessions were other responsibilities of this group.

In order to give trainees an opportunity to apply some of their new ideas to a realistic work situation with an emphasis on team-work, the study groups spent an afternoon session toward the end of the third week on an "action problem". This problem was developed by the planning council, and was presented as a field report on an imaginary atoll. The groups were asked to discuss this and prepare a written summary covering what was done wrong; what was done right; what was left undone; and what additional work might be done to improve the health of the hypothetical island.

Since different categories of workers and professions were represented at the Course, it was expected that a divergence of interests would occur. Consequently, starting with the second week, special-interest groups were organized by the planning council. Emphasis in all was on the health education aspects of problems in these areas, rather than on technical information. Whenever a group wished to observe at first-hand a particular problem in a field setting, arrangements were made for field visits.

During the Course, various groups visited schools, food plants, water treatment points, the tuberculosis hospital, a village clinic and a dairy as part of their work. All field trips were carefully planned and carried out for a purpose connected with health education activities in their areas.

During the Course, interest was expressed in receiving special information in the use of motion pictures, film strips, flannelgraphs, flip charts and posters. Two special evening sessions were scheduled with the purpose of focusing attention on the limitations of these media and clarifying their function and use in an overall health education programme in the territories concerned.

Library And Recreational Committees

A library committee was formed and had the responsibility of arranging the various books, publications and other materials used by trainees and staff. This committee also prepared displays to stimulate interest in pertinent materials and to encourage the general use of the library facilities.

A recreation committee set up with the assistance of trainees from each study group was responsible for organizing all types of recreation and sport activities. A recreation room adiacent to the living area was provided with table tennis equipment, record player, soft-drink machine and magazines.

Evaluation

An evaluation committee composed of trainees and assisted by a staff member was set up to determine the relative success and weakness of the Course in terms of its objectives and the expectations of the staff and trainees. Several evaluations were carried out during the Course to allow each member to examine the progress he was making as a group member as well as in new ideas about health education. This information was of great value in determining the subsequent Course activities.

In order to appraise the Course itself and to form a basis for future planning and follow-up work, the evaluation committee devised a comprehensive questionnaire which was answered by the trainees on the last day.

With the belief that helping groups in villages to find and solve their health problems is an essential part of health work, emphasis throughout the Course was placed on group work. Besides basing the Course itself on the group method, opportunities were provided the trainees to study and evaluate individual and group behaviour as well as to determine how the principles of group work could be applied to their health work.

Assisting the trainees to relate what they were learning at the Course to their back-home work was an important part of the Course. Throughout, careful attention was given to this problem, and during the last two days the trainees met by districts to discuss and plan what they might do as individuals, and how they might work together and co-ordinate their health education activities and programmes upon their return home. Two sessions were given to this back-home planning activity, and the ideas of each group were shared at a final plenary session.

As the Course proceeded, both the staff and the trainees became increasingly aware of the need for follow-up work after the Course in terms of support and reinforcement for the trainees. At their final meeting after the Course, the staff agreed that each trainee would be visited by at least one staff member regularly, starting six months after the Course. A tentative work plan was set up, and will be carried through in the district schedules.

Norfolk Island Fisheries Survey

(Continued from page 21)

is 120 whales per year. These are humpbacks, caught near the shore during their migrations to and from warmer waters near the Equator.

Actually, transport and marketing are the main problems in the development of commercial fisheries on the island. The distance from Norfolk Island to Sydney is 930 miles. However, frozen fish fillets have to be shipped there by the only regular shipping line, which operates via the New Hebrides and the Solomon Islands, a distance of close on 3,000 miles.

According to Norfolk Islanders, this "dream fish" when eaten often causes nightmares.

Fijians Develop Manganese Mine

Part of the mine gang at the workings. Note stockpiles.

In 1954 a group of Fijians registered their claim to a deposit of manganese ore they had located near their village of Vunamoli, on the west side of Viti Levu. They formed an association to exploit their find, and, following early difficulties, have developed the mine into a paying proposition.

By KARL R. FLEISCHMAN*

IN Fiji, mining is one of the main primary industries. The latest development in this field is the mining of manganese, which occurs in small lens-like orebodies throughout the Group, the best producing areas being on the western side of the island of Viti Levu.

In 1954 local Fijians reported the finding of a small but fairly high-grade manganese deposit near the village of Vunamoli on the western side of Viti Levu, and registered their claim. This action was taken on their own initiative, following government encouragement to Fijians to prospect for payable deposits.

The deposits were small in extent, with a possible life expectancy of around 10,000 tons of manganese ore of metallurgical grade, basis 46 per cent. manganese content. Prices of the ore since 1954 have ranged from £F.9 (46% manganese content) to £F.17 (50% manganese content) at the shipping port of Lautoka.

After a preliminary examination of the deposits, which were located in heavy jungle country, it was decided they could be worked profitably, providing operating funds could be obtained. An estimated £F.3,500 was needed to open up the mines, buy machinery and provide access.

Association Formed

The owners decided to form themselves into an association comprising all the men over 18 years of age residing in six villages in the area, totalling some four hundred in all, and nominated one of their number as "trustee" and chairman. The reason for selecting the six villages is somewhat obscure, but it would appear that kinship relationships tie them together, as at least four had no connection with the finding and opening up of the deposits.

At the first annual general meeting of the Association, a committee of five was elected. (No person of chiefly rank is associated with the venture as chairman or committee member, though this policy was not deliberate. Members of chiefly rank vote and participate just as ordinary members.)

Endeavours were made unsuccessfully to secure operating funds by loan from provincial and government bodies. A privately-owned bank was also approached, but without success. The Government, however, was able to provide necessary hand tools on a loan basis, and also technical assistance.

For about five months between fifteen and twenty-five men, all members of the Association, worked on a voluntary basis under their elected chairman clearing the area, opening up some of the outcrops and transporting almost 100 tons of ore by pack horse to the nearest road, some 6½ miles distant.

While this effort should not be minimized, it soon became evident that the voluntary scheme was not a success. Absenteeism was very high, and full control over labour could not be achieved. It was found impracticable to implement schemes for the economic working of the deposits, and labour discipline was lacking.

In the meantime manganese prices had dropped sharply, and for some months there was practically no market for ore. While the Association had none ready for sale, the depressed market made it more difficult to obtain the necessary funds to build a road to the deposits, buy machinery and employ paid labour.

Various private mine operators were interested in taking the mines over, but mostly on the basis of a small royalty per ton. Then an offer was made by a private firm to take a half-share in return for a cash payment to the Association, plus an interest-free loan to the proposed syndicate for the purpose of financing operations, buying machinery and building a road, until such a time as the syndicate could stand on its own feet.

Vunamoli Mining Syndicate

This offer was accepted and the Vunamoli Mining Syndicate was formed, with one half-share owned by private European interests and the other by the Vunamoli Association through its committee and chairman, the latter being trustee.

The Vunamoli Association was not constituted as a co-operative, but under its rules each male member over 18 years of age has a vote and shares in the Association funds. Only a full meeting of members has power, by majority vote, to determine policy in regard to disposal of profits accruing from the operations.

After the Syndicate was formed the best men available were appointed as foreman, sub-foremen and leading hands, while all labour was carefully chosen on its merits. Selection of personnel was not confined to members of the Association, but the ablest and most reliable men available locally were selected.

Operations have since been conducted on a business footing. Time sheets are kept, while the accounts are looked after by a part-time book-keeper. A local firm audits the accounts. All cheques are signed by the book-keeper and the Association chairman.

The mine foreman hires and dismisses men. All staff and labour are non-

* Mr. Fleischman, a consulting mining and geological engineer, acts as adviser to the Vunamoli Association.

Above: Mine truck on the road, which had to be specially built to provide access to the mine. Right: Mine staff house.

European, the foreman being a Rotuman, the two sub-foremen Fijian and part-Fijian, while leading hands are all Fijian. Labour and staff are paid monthly.

The writer, acting as consultant, is responsible for overall policy on the operating side, and continues to act as adviser to the Association. To all intents and purposes the venture is on a day-by-day basis completely run by local, non-European personnel.

Early Problems

It is of interest to reflect on some of the problems encountered. In the early stages great difficulty was experienced in enforcing labour discipline and preventing absenteeism. While the labour would have respected European and Indian supervision, there was clearly not the same respect for supervision by Fijians, part-Fijians or other islanders. On the part of the staff there was hesitancy to reprimand or dismiss unsatisfactory labour.

The situation was remedied by persuading committee members of the need —in their own interests—to conduct operations on a proper business footing, and that labour discipline was essential for success. Several months elapsed before they were convinced of the need for both, and for them in turn to exercise their influence on the labour force. Staff members were likewise instructed on the need for fairness and firmness, and gradually it became possible for the operating staff to engage labour without reference to, or fear of, the committee and Association membership.

The tendency for committee members to yield to pressure by individual members of the Association for employment on the project, and to use their influence in turn on the mine foreman, was also one that had to be continually resisted by persuasion in the early stages.

These difficulties have been overcome and the project now operates similar to any other business. The committee, however, continues to be very active and concerns itself, among other things, with labour problems, working conditions and so on, which are discussed between the chairman and mine foreman, and sometimes at full committee meetings attended by the foreman and the writer.

Profits Build New Homes

In the early stages there was evidence of increasing lack of enthusiasm when no funds were available for profit distribution and there was nothing to show for the effort extended on the project. However, as profits became available, a general meeting of the Association endorsed a policy of building a number of new homes in the village of Vunamoli.

Six such houses have been built. While they measure only 24 feet by 14 feet, they are of wood and iron construction, and are painted throughout with a variety of bright and pleasing colours. Altogether they are a substantial improvement on the old-style native house. Each has a fenced compound which it is the responsibility of the occupier to maintain in good order. The full meeting of the Association allocates homes available for occupation. Each costs about £F.380 and is entirely built by paid labour.

Following upon initial successes, labour and staff complained to the foreman that certain committee members were continually watching to see that they were working; that in fact one committee member had been watching them from hiding. At a committee meeting the members agreed to act with due respect for men and staff.

Minor interference by committee members in the day-to-day operations of the mines still occurs occasionally, mainly by members dealing directly with labour over the heads of the staff, but this is on the decline. (A total labour force of some 55 men is now employed, and a staff of four.)

Another difficulty experienced in the early stages was occasioned by frequent demands by individuals and committee members for money for feasts and other festivities. However, money could be spent only with the general approval of the majority of members, and it had become policy in the first place to build houses. Demands by individuals for money for their own use gradually ceased when it was realised that while £5 or so to an individual would buy little, housing meant a definite improvement in living standards.

The chairman and committee members receive no pay, but may apply for jobs on the mines. If employed they are of course paid at regular rates. Several committee members do, in fact, work at the mines as labourers.

The membership has, however, now agreed that the chairman of the Association shall be paid a small retainer for his services, amounting to about £F.15 per month. The chairman, a Fijian, has served the Association continuously since its inception.

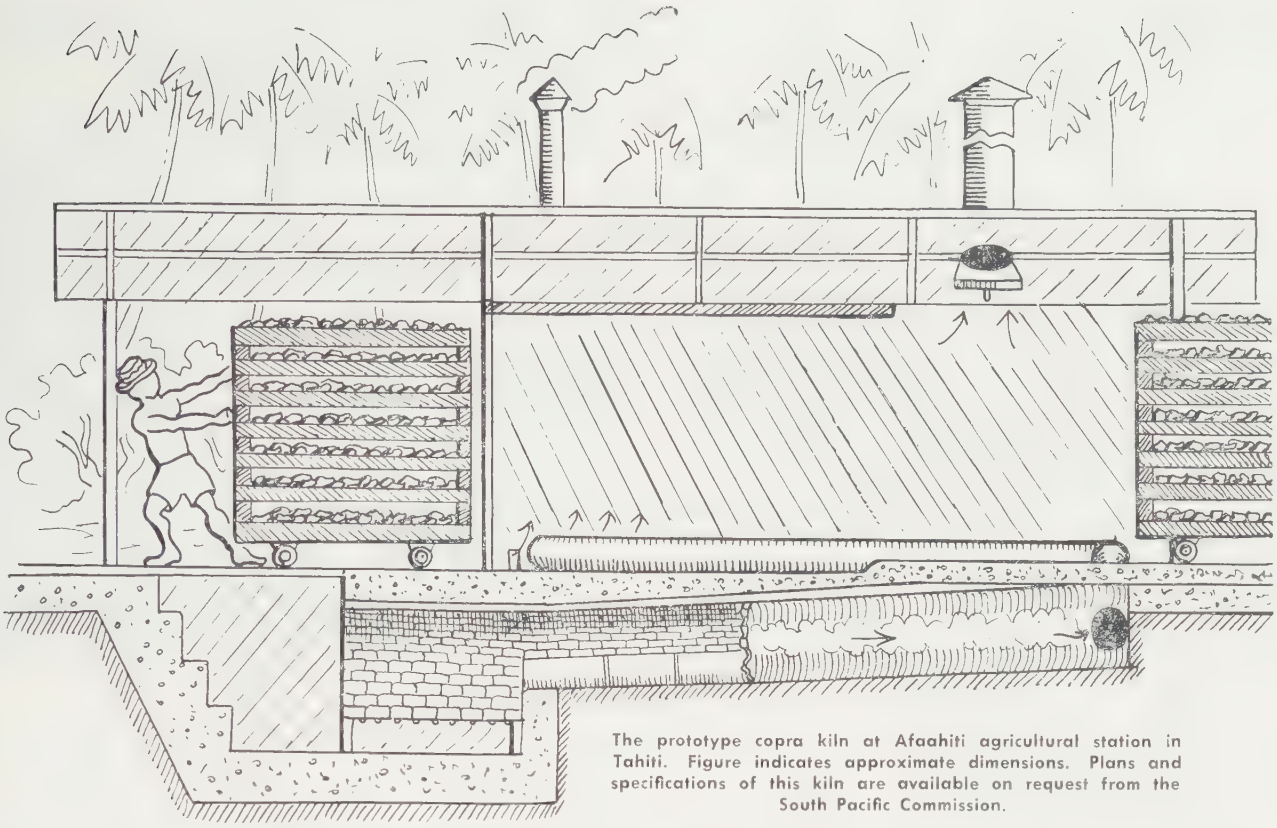
The Association has become incorporated as a business, with the registered trade name of Vunamoli Association.

Subsidiary Projects

Aside from building houses, the Association is also in the process of planting, in coffee, forty acres of land leased from members. Paid labour is used on this project.

Members owning a forest in the area have also agreed to make it available to the Association for the cutting of timber. In return, the owners will have

(Continued on page 40)



The prototype copra kiln at Afaahiti agricultural station in Tahiti. Figure indicates approximate dimensions. Plans and specifications of this kiln are available on request from the South Pacific Commission.

Hot-Air Drier For French Planters

This hot-air copra drier is a modification of one developed for use in the Cook Islands. Following the building of a prototype by the Department of Agriculture in French Polynesia at its Afaahiti Station in Tahiti, twenty more of similar type have so far been constructed by planters on the island, who hitherto had used only sun drying.

By R. MILLAUD and J. BARRAU*

IN his report *The Manufacture of Copra in the Pacific Islands* (SPC Technical Paper No. 82), Mr. W. V. D. Pieris described a hot-air drier used in Rarotonga, in the Cook Islands, to make high quality copra.

Mr. Pieris also stated that the agricultural authorities in French Polynesia were considering introducing this type of drier there. This has now been done. However, when the first model of the drier was built at the Afaahiti Station in Tahiti various modifications were made, and it might be of interest to record them here.

The main objectives of the alterations were to make the operation of the drier continuous; to increase its capacity; to reduce to a minimum the handling of kernels during the drying process; and to simplify the heating process.

Principle Of Operation

Strictly speaking, the Afaahiti kiln (see diagram) is a tunnel which accommodates, end-to-end, three trolleys running on iron rails. Each trolley holds seven rows of trays on which the kernels are spread for drying. Each day a trolley of copra is taken out at one end of the kiln and replaced at the other by a trolley of fresh kernels.

The main hot-air flue is a sloping pipe placed under the concrete slab supporting the trolleys. At the end of the kiln remote from the furnace (which is underground) the flue rises to floor level, where it is connected to two lateral return pipes running on either side of the rails. These pipes in turn open into chimneys placed on either side of the kiln at the furnace end. At the same end, at floor level, there are openings for the intake of fresh air. The hot, damp air is expelled through a chimney in the roof at the other end of the kiln. The building has a ceiling except over a third of its length, under the chimney mentioned above.

Kernels are extracted with a hollow chisel on a concrete floor near the kiln. The husks and hulls are used in the furnace.

Firing starts at 7 a.m. every morning and is kept up until 4 p.m. During this period the concrete slab under which are embedded the main hot-air tunnel and furnace stores up heat which is gradu-

* M. Millaud is Head of the Department of Agriculture in French Polynesia. Dr. Barrau is Plant Introduction Officer, South Pacific Commission.

Above: General view of the drier. Right: A trolley load of copra leaving the kiln, which has a capacity of 1,200 nuts per day.

ally released during the night. Experience has proved that this is sufficient to ensure uninterrupted drying.

It takes approximately three-and-a-half hours to spread the kernels on the trays which, as soon as they are loaded, are placed one by one on the trolley standing in the kiln at the end remote from the furnace. Twenty-four hours later the trolley is moved into second position in the middle of the kiln, and the trolley in third position is taken out for unloading. After another twenty-four hours the trolley is placed at the end of the kiln over the furnace, whence it will leave the kiln and be unloaded on the morning of the fourth day.

The kiln at Afaahiti has a capacity of 1,200 nuts a day. The furnace burns 300-400 kgs.[1] of husks and hulls during each firing.

At Afaahiti, the drier operates 250 days a year and produces 60 to 70 tons of copra. The total drying area of the trays is 104 sq. m. and each tray carried 64.4 kgs. of kernels.

This type of drier as built at Afaahiti is rather expensive as it costs approximately 150,000 Pacific francs,[2] but one must remember that it is built to last, the materials used being concrete, fireproof bricks, etc.

It has been estimated at that station that, including amortization and the cost of maintenance spread over ten years, the total cost of the drier is 306,750 Pacific francs. For an annual production of 70 tons this means adding 0.438 Pacific francs to the 1.225 francs which is the cost of labour per kilogram to make copra, bringing the total to 1.663 francs. At present, in Tahiti, a kilogram of copra sells for 8.36 francs.

The demonstration of this type of drier at Afaahiti has obviously been convincing, for there are now twenty operating in Tahiti where, up to now, sun-drying has been the only method used.

[1] One kilogram equals 2.2 pounds.

[2] £Stg1.0.0 equals 213 Pacific francs.

Fijians Develop Manganese Mine

(Continued from page 38)

standard-size houses built for them. The experimental planting of trees for the Association has also been agreed to, and is to commence shortly.

From the point of view of the Fijian owners, the main advantages of the scheme are that they are being trained to shoulder responsibility and to approach a venture in a business-like manner. Also, profits are devoted to improving living standards and to re-invest in long-term projects. The Fijian is generally concerned to see something for his efforts. It need not be of direct personal benefit, but a visible project, such as planting coffee or building houses or engaging in other commercial venture for profit fires his imagination, far more so than having a substantial amount of money locked up in his own personal bank account. Idle money has little significance for the Fijian, even though it may be held for his protection.

The Vunamoli project neither interferes with nor displaces the traditional Fijian communal chiefly system. Instead, it superimposes upon a society bound by traditions, modern commercial enterprise, retaining the traditional and sociologically established collective spirit and outlook to which the Fijian, in common with other island peoples is environmentally conditioned.

In return the Fijians have responded with intelligence, patience and understanding to the responsibilities placed upon them, and it is obvious that they feel that they are partaking in an important task designed to raise their own living standards.

Similar schemes could no doubt succeed throughout the South Pacific if funds were made available on loan, and if sufficiently enthusiastic and sympathetic, yet competent, general supervision of each project were to be provided.

Some Conclusions

The success of the Vunamoli project leads to certain conclusions. In the first place, it seems that Fijians are well able to take part in commercial ventures even though in modified form, the basis being collective rather than individual participation. Secondly, they can successfully carry responsibility, providing they are selected on individual merit, are clear about the task to be performed, and are continually encouraged to think about problems encountered and to offer suggestions. They must also feel that they have a stake in the venture, and are responsible for all decisions.

Lastly, they are keenly aware of the need and desirability to raise their own standard of living and level of education, but unless given a lead are somewhat at a loss to know how and where to start.

Investigation To Extend Season Of Breadfruit Yield

As a special assignment the Commission's plant introduction officer is investigating the possibilities of extending the present short season of yield of breadfruit in most islands by introducing, grouped together, strains bearing at different times of the year. He reports encouraging progress in this article.

By JACQUES BARRAU

Above: This drawing of a breadfruit tree, probably the earliest ever made by a European, was executed around 1640 in Amboina by Dutch botanist Rumphius. It was first published in his "Herbarium Amboineux". Right: A Tahitian breadfruit tree cultivar, vai paere. Below are leaves of five Fijian cultivars of the breadfruit tree. Note variations in shape and size.

ALMOST everywhere in the South Pacific the breadfruit, which is called *Artocarpus altilis* by some botanists, *Artocarpus incisus* or *Artocarpus communis* by others, is an important food plant.

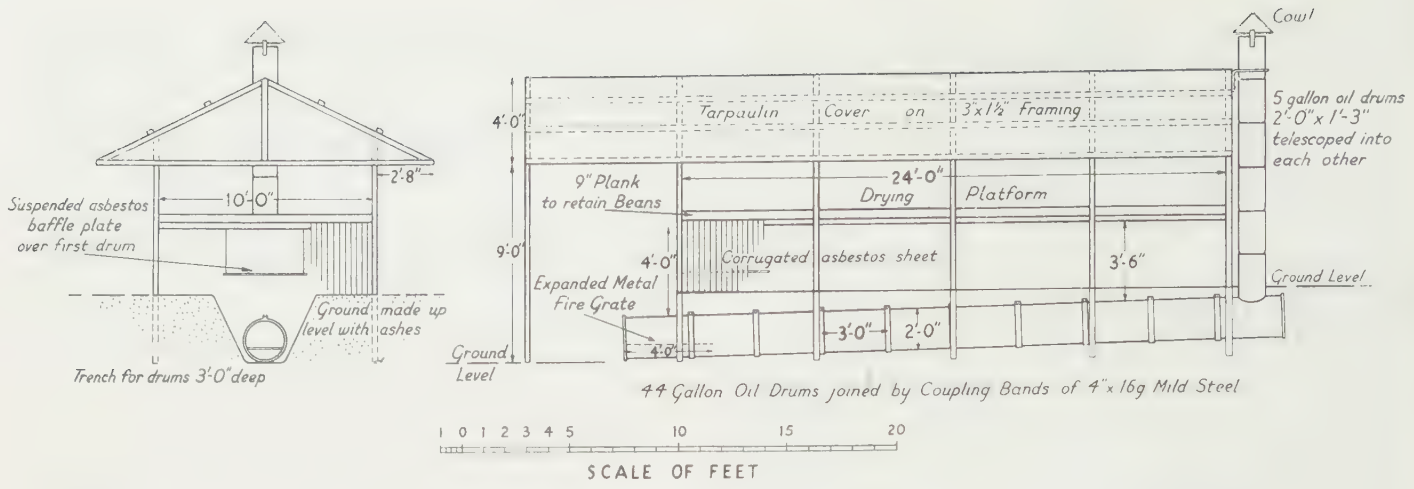
In some islands it is a staple food crop, as in the Samoa and Marquesas Islands, and the Micronesian island of Truk, in the Carolines.

Generally breadfruit bears only for a limited season, and it would be a great improvement if the fruiting time could be extended, either by finding early- and late-producing varieties, or varieties that bear all the year round. For this reason the South Pacific Commission is carrying out a regional study on this useful plant.

Rather paradoxically, while the breadfruit tree is one of the most popular food plants in the South Pacific, we have very little detailed information on it. Thus the first step in the Commission's research project had to begin with a survey of breadfruit cultivars (or cultivated varieties) found in the South Pacific islands.

It was also necessary to ascertain the fruiting times of the breadfruit tree. It was known that in the islands of the

(Continued on page 43)



Sectional views of the Samoa hot-air cocoa drier, which has a drying platform 10′ x 24′. With a layer of cocoa beans 2″ deep over this, half a ton of dry beans can be produced at a time.

The Samoan Hot-Air Cocoa Drier

Materials readily available in the islands are used in this easy-to-build cocoa drier, which with slight modification can be converted to dry copra. Its construction is described in a booklet reviewed below by . . .

D. R. A. EDEN

PLANTERS with estates ranging from 50 to 200 acres of bearing cocoa will find of interest a recent publication of Messrs. Cadbury Brothers of Bournville, England, entitled *The Samoan Cocoa Drier*.

Following the basic design of the larger and more expensive Martin cocoa drier, which originated on the cocoa plantations of the New Zealand Reparation Estates in Western Samoa,* the modified drier is said to be both simple to construct and easy to operate.

Materials Readily Available In Pacific

According to the booklet, a prototype of the drier was built and tested at Bournville with a drying platform 24′ long and 10′ wide. It was found that with a layer of cocoa beans 2″ deep over the whole platform, half a ton of dry beans could be produced per batch. The plant was built entirely of materials which are readily available in any of the Pacific island groups.

As the diagram indicates, the plant has a single flue running below the platform from one end to the other. The platform is constructed 3′-4′ above the flue. The space beneath is enclosed, so that cold air may be drawn in or enter only around the flue at either end. Also, the air, after being heated, can escape only by rising through the slatted platform and the layers of beans.

Flue Made From Petrol Drums

The flue is constructed of ten petrol drums from which both ends have been removed. The drums are joined by metal collars, 4″ wide. Joints are packed with asbestos tape and the collar tightened by means of two bolts passing through brackets of angle iron riveted to the collar (see illustration).

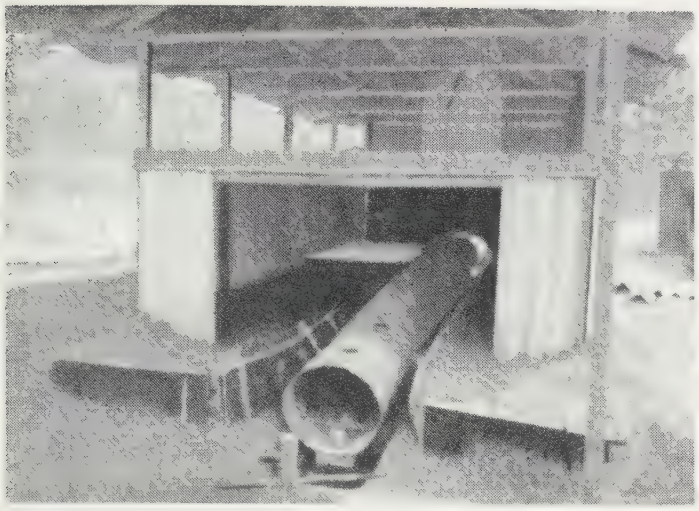
The flue should slope upward toward the chimney end, there being a difference of about one foot in height between the two ends. The chimney is constructed of smaller drums, about 9″ in diameter. One end of the chimney drums is cut vertically in several places, and the metal hammered inwards slightly, so that one drum may be placed firmly over the other. The chimney is fixed to the flue by cutting a hole in the curved surface of the end flue drum, and easing the chimney into the aperture (see illustration).

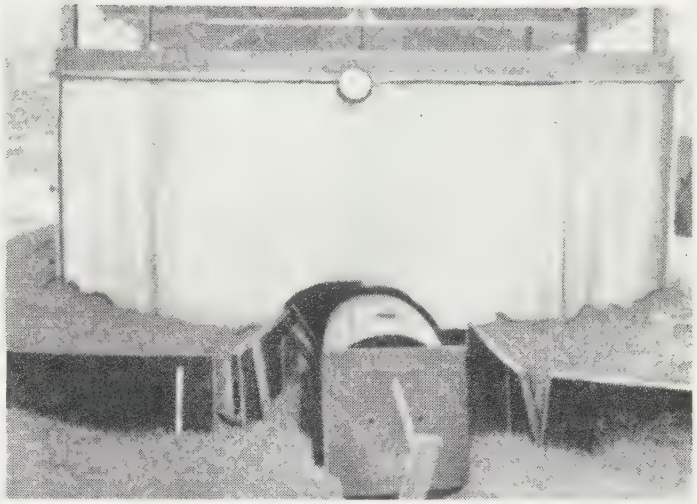
The wooden framework of the drier is built over the flue to support both the walls of the drier and the platform. The walls can be made of any fire-resistant material such as corrugated iron or asbestos sheeting. The end walls fit roughly over the flue, a small space being left for the cold air to enter. Some sheets of iron or asbestos should be detachable to give access inside the drier. The drying platform is made of wooden slats, 1″ wide, 1½″ deep with a space of 3/16″ between.

In operating the drier a fire is stoked on a metal fire-grate in the first section of the flue pipe. This is controlled by a damper plate placed over the firing end (see illustration). The damper controls combustion by limiting the air supply. The booklet warns that the temperature of the drying air in the heating chamber should not be allowed to rise above 80° C.

* Now the Western Samoa Trust Estates Corporation.

Left and centre: Joints in the petrol-drum flue are closed by asbestos tape and metal strip fastened with angle iron and bolts. Right: Method of joining chimney to flue.





Above: The drier nearing completion. Note that the hot-air chamber is totally enclosed at the sides, and that a baffle-plate of asbestos is suspended over the firing end of the flue. The roof is extended at the sides and front as additional protection against rain. Right: The finished drier, with thermometer, damper, and the ends of the hot-air chamber closed except for a space round the firing end of the flue.

Samoan Drier Easy To Build

The Samoan cocoa drier is a simplified, cheaper version of the Martin cocoa dehydrator. It contains all the essential features of the larger drier, but possesses the advantage of being so simple to construct that any handyman on a plantation could build one. It can be recommended for the consideration of planters and smallholders who may be requiring a plant with an out-turn capacity of half a ton, dry.

Conversion To Copra Drier

Although designed as a cocoa drier, it would be possible, by substituting copra-mesh wire in place of the wooden slats on the drying platform, or even widening the spaces between the wooden slats, to convert the plant into a small copra drier. With such a modification, the plant would resemble the well-known "Kukum" copra drier.

[EDITOR'S NOTE: Copies of the above booklet are available on request from Messrs. Cadbury Bros., Hobart, Tasmania.]

Extending Breadfruit Season

(Continued from page 41)

southern trade winds area there are two main harvests during the year, but the information was vague and frequently contradictory.

By the end of 1958 a number of cultivars equivalent to about two hundred different vernacular names had been studied in the British Solomon Islands, Fiji, French Polynesia, New Caledonia, Netherlands New Guinea, Samoa, and Papua and New Guinea.

It was found that early and late production was not only due to special ecologic conditions, but was also a cultivarietal character. Moreover, some breadfruit trees when growing in particularly good conditions can fruit almost all the year around, but some cultivars seem to have the same characteristic whatever the conditions in which they are growing.

This is encouraging, as it indicates that it should be possible to extend the fruiting season of the breadfruit tree by widening the range of its cultivars in one island by introducing others from other island groups.

Nevertheless, many aspects remain to be studied and verified before interterritorial exchange of breadfruit cultivars can be organized. The ideal procedure would be first to establish a collection of the best breadfruit trees found in the area and study their behaviour in the same environment.

It is hoped that by the end of 1959 a monograph on the breadfruit tree in the South Pacific islands will be completed in which the results of these preliminary investigations will be presented and analysed.

Fijian breadfruit uto dina (the true uto), a seedless, smooth-skinned variety.

Fine wood and valuable oil from

The Tamanu Tree

By JACQUES BARRAU

Leaves, flowers and fruit of the tamanu tree. From the kernels (see photo) a greenish oil can be extracted of value in the cosmetic industry. (Photograph and drawing by the author.)

MOST people living in the islands know this beautiful tree with white fragrant flowers which the botanists call *Calophyllum inophyllum* L. Found mostly along beaches and coastal forests. it belongs to the family *guttiferae*, which includes some economic species such as two well-known tropical fruit trees, the mangosteen and the mammee, or St. Domingo apricot, grown in some South Pacific territories.

In its *Account of a Government Mission to the Vitian or Fijian Islands in the Years 1860-61*, published in Cambridge in 1862, the botanist Seeman mentioned that the Wesleyan Mission had exported from Fiji to Sydney, oil extracted from *Calophyllum inophyllum* kernels. This oil was bought at a fairly high price by a Sydney pharmacist.

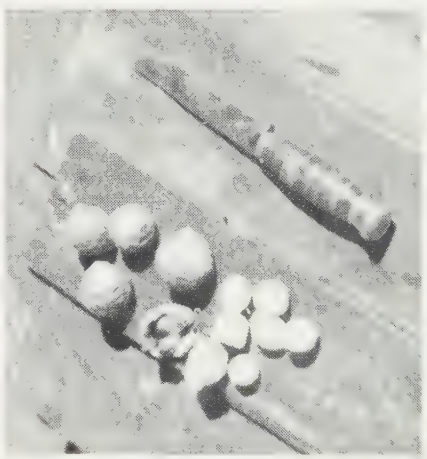
Calophyllum inophyllum is the ATI, TAMANU or KAMANU of French Polynesia, the TAMANU of the Cook Island, the KAMANU of Hawaii, the FETAU of Samoa, the DILO of Fiji, etc.

In Samoa, the tree called TAMANU is considered by some botanists as a different species of *Calophyllum, C. samoense* Christ. As a matter of fact, the DAMANU of Fiji is also apparently another species which has been called *C. burmanii* Wright. The same name is also used for *C. spectabile* Willd., which is called DAMANU DILO DILO.

The reddish, fine-grained wood of *Calophyllum inophyllum* is beautiful and makes excellent furniture, bowls, canoes, and carved objects, etc.

Since ancient days the Polynesians knew that parts of this tree could be used as medicine. Generally, the thick, greenish oil that can be extracted from the kernels was used for this purpose, though in Samoa and Tahiti the leaves were also employed. The use of the gummy sap for medicinal purposes has also been reported.

The Tahitians used a mixture of the oil with coconut oil as a dressing for their hair, and as a liniment.



In the early days of New Caledonia the burnt kernels were used as a source of black dye for tattooing. The fresh kernel is toxic, but is said nevertheless to have been eaten by some islanders after being roasted in a special way.

Calophyllum inophyllum is found not only in the South Pacific islands but also as far as tropical Asia where, in Viet-Nam, the tree is valued as a medicinal plant that provides a cure for ulcers.

At one stage the oil was found by Europeans to be of some value in the treatment of leprosy. Since that time, however, synthetic drugs have been discovered that control this disease much more effectively.

A lesser-known fact is that the South Pacific islands export a small quantity of *Calophyllum* kernels. For instance, in 1957 Tahiti exported to France, packed in drums, six tons of sun-dried kernels, and fifteen tons in 1958. The oil is extracted mostly for use in the cosmetic industry.

While there is not a wide market for *Calophyllum* kernels there is certainly sufficient demand to demonstrate that local wild plants of the South Pacific islands can sometimes be a source of cash income.

Make This Paravane For Deep Trolling

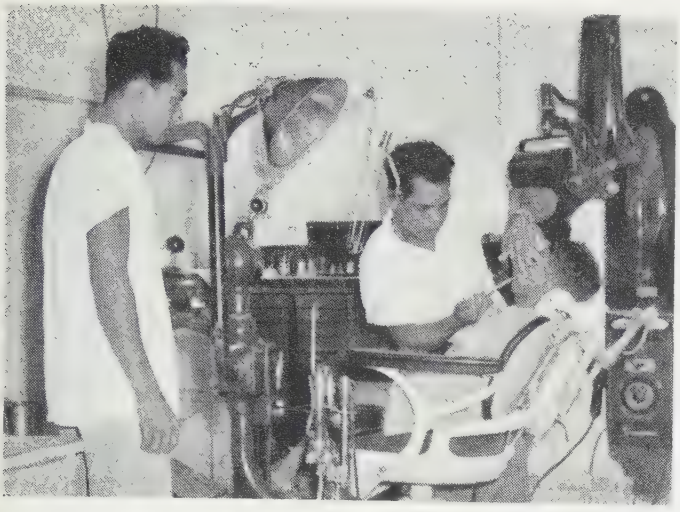
SEVERAL New Caledonian fishermen are taking improved catches of tazar, or Spanish mackerel, by trolling not on or near the surface but at depths of around seven to ten fathoms, according to SPC assistant fisheries officer Louis Devambez.

To take their lines to this depth they are using a small paravane modelled on a type commonly used by Japanese fishermen for the purpose.

To make one, take a piece of board 8″ x 4″ x 1″. Rule a line across it 2½″ from one end. Starting from this line, plane the board down to a thickness of ⅛″ at each end. The board thus becomes roof-shaped, with one short and one long slope. Drill a hole about 1½″ from each end, in the centre.

To the back of the board (the flat side), nail or rivet near the shorter slope end a rectangle of lead weighing 8 or 10 oz. Lastly, tie a main line 100-150 feet long through the hole in the shorter slope, and a 20-foot nylon or wire leader, with hook and lure attached, through the hole in the longer.

With this rig towed at four to six knots the paravane will take the lure down deep. When a fish takes the lure, however, the paravane becomes ineffective and the rig comes to the surface.



Above: A Micronesian dental practitioner at work in the District Dental Clinic at Koror, in the Palau Group. Looking on is a colleague from the Ponape District. Right: The author examines the teeth of a young patient.

Dental Services In The United States Trust Territory

Today, the dental services in the United States Trust Territory of the Pacific Islands are completely manned by Micronesians, including some nineteen dentists, a group of laboratory technicians, and dental aides. How this has been accomplished in ten years is described in this article . . .

By A. A. JAFFE*

UNTIL 1948 my knowledge of the South Pacific was meagre indeed. For many years I had practised in a typical Illinois community, specializing in dental surgery. My assignment to the Trust Territory was a venture into a completely new sphere: geographic, climatic and cultural.

I was to learn that in aptly-named Micronesia (Tiny Islands) there are approximately 2141 islands, with a total area of only 687 square miles, scattered over some three million square miles of ocean. From east to west, Micronesia spans about 2765 miles; from north to south about 1300 miles, forming an area roughly equivalent to that of the continental United States of America or Australia.

On a map, the Trust Territory can be found north-east of New Guinea between the equator and the Tropic of Cancer, and between the International Date Line and approximately 140° east. There are three distinct archipelagoes: the Marianas, Carolines and Marshalls.

Ninety-six Inhabited Islands In Six Districts

There are 96 inhabited islands and atolls in the six districts at present administered by the United States Department of the Interior. With populations as at June 1958, they are:

Marshall Islands	13,928
Ponape	14,335
Truk	19,807
Palau	8,845
Yap	5,459
Rota	970
Total:	63,344

Micronesians enjoy the same type of fundamental rights that the constitution of the United States assures its citizens.

Early Difficulties

At the outset of our operations to establish a dental service in the territory we were faced with the handicap of limited personnel, while another major problem was to reach the people in the vast areas in which they are scattered. The air distance from the Marshalls to Ponape is 791 miles; Ponape to Truk 374 miles; Truk to Guam 562 miles; Guam to Yap 462 miles; Yap to Palau 250 miles and Guam to Rota 40 miles. The outlying islands may be hundreds of miles from the district centres.

From the beginning it was realized that the ultimate success of the Dental Services programme depended on educating the Micronesians "to do for themselves." It was necessary to convince them of the need for professional dental help. Oral hygiene meant nothing to them—most of them had never seen a toothbrush.

Another early problem which had to be faced was the Micronesian's fear of "something new," a fear which is not the sole property of uneducated people. Fortunately, their basic good nature was of constant help.[1]

One of my first field trips taught me this, as well as bringing home to me the reassuring fact that children are children the world over. At one out-island school there were about forty children to examine, and I arranged with their teacher to line them up, with the oldest—from 15 to 17 years—at the head of the line. I did this to encourage the six-year-olds at the foot of the line not to be afraid. Meanwhile, about one hundred people, all vastly curious, sat on the ground watching me closely.

Like an actor getting ready for a show, I began arranging my instruments, not sure whether the audience, so vital to the success of the performance, would really participate. I overheard the first two girls in line repeat to each other:

* Dr. Jaffe is Director of Dental Services, United States Trust Territory of the Pacific Islands.

[1] My earliest impressions of the Micronesian people have not changed during my many years in close contact with them. They are kind, courteous and well-mannered, with pleasant personalities.

Marshallese on the way to the dispensary at Majuro, Marshall Islands District.

"You go first", and then, "No, you go first". This continued back and forth until I began to fear the play would never begin. Then, from far back at the foot of the line, a pleasant little six-year-old advanced bravely to the dental chair, climbed into it, and, with a big grin, opened her mouth to be examined. I was saved! The crowd noisily demonstrated their delight.

First Assignment In Marshalls

My first assignment, in the early days of 1948, was in the Marshall Islands District. My staff and I examined 575 Marshallese and found that the caries rate incidence per person was four of the permanent teeth in the 6 to 17 years age group. This rate was also found in the 18 to 40 years age group. In the 40 to 65 years age group were found many caries, residual roots, and much periodontoclasia so far advanced that no reparative treatment was possible. All had some teeth missing and in need of partial or full dentures.

Yapese Children An Exception

We discovered later that these conditions prevailed generally among all the territory's residents, with one exception. Among the Yapese children, the low caries rate astounded us.

In Yap we examined 170 children between the ages of 6 and 17 years, and found only 34 caries, involving 18 permanent teeth, or one cavity per five children. Why the difference? Most of the Yapese children had never used a toothbrush. None had ever received dental treatment.

We were drawn to the conclusion that this low caries rate is directly attributable to their diet, dominantly taro and fish. Fish especially supplies the calcium, phosphorus, and oils that build good teeth. In addition, the Yapese diet includes meat, breadfruit (seasonal), coconuts, yams, bananas, and pandanus—the last being a fine source of Vitamin C. Pandanus fibres were noticed in many mouths, stuck between teeth, and I later learned that some children and adults use these fibres much as we use a toothbrush.

In addition, it was noted that with very few exceptions, all Yapese adults—and perhaps 80% of the children—chew betel nut, which would seem to prevent tooth decay to a considerable degree, although the nut has the objectionable effect, to the Western eye, of discolouring the crowns of teeth from brown to deep black. It also stains the lips, tongue, buccal and labial tissues. The betel nut is astringent, making the saliva alkaline, and it has a bitter aromatic taste. It is also a stimulant, increasing the flow of saliva and gastric juices.[2]

Field Visits A Feature Of Service

The first experimental work in the Marshall Islands gave an insight into the dental problems of the Micronesians and enabled us to crystallize a policy which later was extended to the rest of the territory.

Field trips to the various districts and outer islands, where most of the territory's residents live, are a dominant feature of the Dental Services programme. As Dental Director of the territory I visit each district three or four times annually, participating in field trips to the outer islands and conferring with local dental personnel as to needs and methods of improving the services.

Field Trips A Joint Enterprise

The field trips are a joint enterprise. Trade goods are transported as well as supplies of all kinds, and copra is picked up for the return trip. Teams from various departments of the Administration go along. Typically, they are made up of medical, dental, educational, and sanitation personnel.

Dental service is free for all children up to 17 years. For patients over 17, payment is arranged of a small fee, related to the local economy to avoid financial hardships. Toothbrushes and powder are distributed free of charge, while instruction on oral hygiene is given.

Where the need arises, free service is provided for adults who are hospital patients or who otherwise need it for humanitarian reasons. At present, each district centre has a hospital and dental clinic completely equipped for operative and laboratory service, staffed mainly with trained Micronesian personnel.

Training Of Local Personnel

In 1946 the Administration, realizing the need for trained personnel, directed the United States Navy to establish a medical practitioner and dental assistant

(Continued on page 56)

Yapese girl. The author found a remarkably low caries rate among the children of Yap Island.

[2] It might be of interest to describe how this nut, which is like a pecan with a fibrous outer covering, is used. The kernel, which is brownish in colour and contains tannic and gallic acids, is sprinkled with lime (burnt ground coral), wrapped in *kebui* leaf, and then chewed and sucked—the local equivalent of chewing tobacco. While betel nut would seem to retard tooth decay, continuous irritation and traumatic injury from the abrasic betel nut fibres cause recession of soft and hard tissue surrounding the teeth. This causes chronic irritation and finally periodontoclasia and eventual loss of teeth.

This land, which overlooks Laucala Bay, Suva, is the site of the Fiji Housing Authority's first construction project. Studying the plan are (left to right): Mr. K. R. Bain (Executive Secretary), Mr. C. B. Stokes (Architect), Mr. J. P. Haren (Engineering Consultant), and Mr. J. N. Falvey, O.B.E. (Chairman of the Authority)

Housing Low-Income Workers In Fiji

The Fiji Housing Authority was set up early in 1957 to assist in providing homes for low-income workers. A cash loans plan to help workers build houses for themselves was launched last October. A construction programme on an area of 43 acres of Crown land in Suva is now due to begin with a pilot project for building 27 houses by contract.

By K. R. BAIN*

ONE of the first things to happen when a country's population begins to grow at a consistently increasing rate without a comparable productive economic expansion is that existing housing becomes sorely pressed. Houses are difficult to find, overcrowding increases, rents go up, maintenance standards drop; and when money is tight—as it has been in Fiji over the past year or so—fewer houses of any kind get built. The first to feel the pinch are those in the low income group.

The Fiji Housing Authority came into being early in 1957, with a mandate to assist in the provision of housing for workers in the low income group in Suva and Lautoka and in any other area which may be prescribed. It is a statutory body financed at present from public funds, but not subject to any form of direct official control. The Chairman and seven members are appointed by the Governor. The initial limitation of the Authority's activities to Suva and Lautoka has been made because it is in these two areas that the shortage of accommodation for the urban worker is most acute. A worker is defined as a person whose average weekly income does not exceed £F12. Thus a workman in Fiji of any race whose income is not more than roughly £F600 a year is eligible for assistance from the Authority.

Now it may seem odd to the casual observer that the Government of a group of Pacific islands should feel the need to invest in public housing when it is not as yet faced with the complexities of the slum clearance or housing replacement problems of many of the world's large cities. The reason is twofold. First, it is precisely to assist in preventing the spread of urban slum living that the Fiji Housing Authority has been formed; and secondly, public funds have to be used because low income housing is never a serious business proposition for normal commercial enterprise except where such organizations are large enough and enlightened enough to regard the construction of housing for their workers as being justified on other than purely commercial grounds.

The fact is that, although the pressure of population on urban housing in Fiji is much less than it is in Hong Kong, Singapore or in many parts of the West Indies, the population, particularly in Fiji's capital, Suva, has in recent years far outgrown available accommodation. This in itself might not be so serious were current and projected building programmes directed towards the provision of housing for the low-income group which forms the largest section of the population. There has already been a comparatively modest investment by Government in industrial housing in the Suva area and in Lautoka and there is some housing for industrial workers in sugar and gold mining areas; but this is all.

In 1952 the Suva City Council launched a programme of demolition of unhealthy and structurally defective buildings. Since few replacements were built, one effect of this action was a reduction in the total number of actual dwellings. In 1954, therefore, demolition virtually came to an end. At the present time something like 1300 houses in Suva are unfit for human habitation. These include unauthorised structures now being built at a rate of about 250 a year. Overcrowding has gradually increased and is difficult both to police and to prevent. If the demolition of sub-

* Executive Secretary, Fiji Housing Authority.

Typical shanty in Antigua, West Indies, where the author spent three months early last year investigating housing schemes for low-income workers.

standard buildings is to go ahead and overcrowding in the city is to be eliminated, it is estimated that housing will be required for some 9,000 to 10,000 persons, comprising 1500 to 1600 families, in Suva alone in the next decade.

These are briefly the facts with which the Fiji Housing Authority was faced when it first met early in 1957. But before it could get properly down to work, a number of important points of official policy had to be cleared up. The most important of these was whether the Authority's object was to provide "social" or "economic" housing. In other words, was there to be subsidised low-income housing or housing that was intended to pay for itself? If the former, how and to what extent should the subsidy be applied? Was the latter a practicable proposition for the low-income group? And how much money was going to be put at the Authority's disposal and when would it get it?

These and other questions were to some extent resolved when the Governor announced in the Legislature in November 1957 that it was proposed to make available to the Authority a free grant of £F200,000 as the first instalment of a total capital of £F500,000 to be provided for low-income housing in the Colony's current development plan. The Authority would retain the income from its investment for use as a revolving fund.

West Indies Investigation

In January 1958 I went to the West Indies for a period of eight weeks to investigate methods of organization, financing and administration of housing for wage-earners in the low-income group and to see on the spot how the Governments of some eight Caribbean territories had over a period of years coped with the massive difficulties with which they have been and are still faced.

The result of this visit is contained in a report to Government written after my return, and its recommendations have been adopted by the Housing Authority as its initial policy. It is not possible here to go into the reasons which led me to conclusions I came to, but they were designed within the framework of the current economic climate of Fiji and they give due weight, of course, to the experience of various West Indian Colonial Governments.

Briefly they are:

(a) A general housing subsidy is out of the question. Subject to (c) below, all schemes undertaken by the Authority should be fully economic. There is no problem of slum clearance in Fiji, at least in the sense that it exists in the West Indies, and any idea of regarding low-income housing as a social matter with rents or loans based on "ability to pay" must be rejected as financially impracticable. The Authority must therefore design and build its first houses for the upper segment of the low-income bracket. Only in this way will it have a real chance of making its schemes paying propositions and of getting a substantial part of its investment back. To the extent that it succeeds in this, so much more money will be available for future housing. Nonetheless it must use every available means to cut building costs to a minimum and so be able to provide for the really low-income worker at the earliest date.

(b) The Authority will work on one hand to prevent further deterioration in housing in the areas with which it is concerned; and, on the other, to contribute towards the needs of an expanding population. It will aim both to build houses itself and to establish the conditions under which the abilities and enterprise of the individual can be directed to housing himself.

(c) Neither the costs of administration nor of land acquisition will be charged to the expenditure figures on which rents or loan repayments are based. Government will provide the land for the Authority's housing development without charge to the Authority. But costs of land subdivision and of the various services provided, being part of specific schemes, will be included in the charges made to the occupant.

(d) The principal aim of the Authority will be home ownership. Rental housing will not be undertaken, at least at the beginning.

(e) Aided self-help housing of the type used in the West Indies and elsewhere is *an* answer to low-income housing, but not *the* answer. It has distinct disadvantages not always apparent at first sight, and not always admitted by its protagonists. It should not be attempted at the start of the Authority's activities.

The Question Of Standards

This covers the substance of the realistic policy basis on which the Authority is now operating. But there is another and equally important point which fundamentally affects building and development costs. This is, of course, the question of standards. It is here that there is probably greater need for balanced realism than in any other single aspect of housing. The standards concerned include local requirements for public health, building, subdivision of land and town planning; and one of the most sensible provisions in Fiji's Housing Ordinance is that which permits the local body administering the regulations to relax or readjust them for housing schemes prepared or approved by the

Authority. In the event of deadlock between the Authority and the local body over an application for relaxation, the Governor in Council is empowered to decide what should be done.

Standards in the Colony are unsuited in many respects to a situation where there is an increasing building land shortage and a rapidly-growing population. For example, the minimum size of a residential lot in Suva is 32 perches, or 8712 sq. ft. This high minimum is nothing short of extravagant in the circumstances of Fiji and can impose considerable hardship on the occupier. In Lautoka the minimum is 24 perches, or 6,600 sq. ft., and even this is more than is required to accommodate an average-sized dwelling in the Colony.

In August 1958 the legislation under which the Authority operates was given a "new look", while the Authority was reconstituted and enlarged to its present total of eight members. On October 1st it launched its first scheme. This was a cash loans plan to assist workers to build houses for themselves by providing the necessary finance on easy terms. The response was immediate. By the end of the year, the Authority had provisionally approved forty out of 120 applications submitted to it, and had committed some £F18,000.

At the same time the Authority's newly-appointed Architect turned his attention to the overall planning and layout of 43 acres of Crown land on the outskirts of Suva which have been handed over to the Authority for its initial construction project. Development of this area will be carried out in stages, the first of which will be a pilot scheme of 27 houses to be built by contract. Work should be starting about the time this article appears. The complete project envisages between 200 and 250 house lots with provision for commercial sites, garden allotments, a community centre, school, clinic, parks and reserves. The garden allotments will generally be of land which is unsuitable as house sites.

The Authority's aim is to provide an environment which offers a reasonable standard of community life and amenities while at the same time keeps the cost within the means of those who will live there. The *Manchester Guardian* once remarked that it is pointless to offer people new houses unless they have the income to maintain them; and—even more important still—the security or at least the prospect of security to make them want to go on living in them. With this touch of realism in mind, the Authority has decided that the houses will be bought by their occupants through what will be virtually a hire-purchase arrangement. To prevent speculation and to ensure that the Authority retains control over the disposal of the house, no dealings will be permitted without the Authority's approval. The land in each lot will be sublet to the occupant, and not sold. Leases will be sufficiently long-term to give adequate security without the right of unrestricted disposal.

House Design And Site Layout

Special attention has been paid to the standard of house design and to site layout. Lots have been planned in sympathy with the shape of the land to form the basis of a housing estate which it is hoped will have an appearance of order and attractiveness. The many detailed problems of estate management and administration are now being tackled; but their principal object will be the encouragement of a community spirit in which all races in the Colony will be represented and which should set a pattern of inter-racial community living. Housing in racial pockets will be avoided, but racial sensitivities will naturally not be ignored.

The main feature of the layout is the use of lot sizes which are considerably less than is the rule in Suva. Instead of being 8712 sq. ft., they will range from 2,820 sq. ft. to 4,190 sq. ft., the average lot size being 3,496 sq. ft. In the pilot project, there will be a total of just under 12.5 lots to the acre instead of the usual 4.

Concrete footpaths will be used extensively throughout the estate. The Authority has adopted the standard at present in use in India, where footpath access is now common in urban development schemes for a maximum distance of 300 ft. from the nearest road. Where footpaths are at a grade which would permit emergency motor traffic or where electric power poles and sewerage are required, the reserve footpath width is a minimum of 10 ft. Other footpaths have a reserve of 6 ft. The paths themselves will be constructed with a 3 ft. width of concrete with 18 ins. of gravel on either side.

The houses in the pilot project will be built on concrete blocks and will be about 412 sq. ft. in size. They will have two bedrooms, a living room, kitchen, lavatory and shower. In order to cut down costs, the ceiling height will be reduced from the present standard of 8 ft. to 7 ft. 3 in. This will result in a saving of £F37 in each house.

Water and electricity will be laid on throughout the scheme. Sewerage is expected to be by means of a communal septic tank.

The houses will be sited 2 ft. from the nearest side boundary to give the most economic use of the land on each site. Generally speaking, the ratio of lot size to house will be in the proportion of about 9 : 1, but in practice this will depend in each case on the layout of the house and of the contours.

All the variations from present practice have been approved by the Suva City Council as the authority responsible for administering the regulations concerned. To achieve this approval has not been without its difficulties, for no-one lightly turns from accepted past practice without good reason. The Authority's approach to the pilot project has been that it is essentially experimental in nature and the lessons to be learned from it will be turned to good account during the development of the rest of the scheme. The way has been left open for the Authority to propose further changes in the light of experience in the pilot project; and for the Council to suggest alterations to the Authority if it later feels they may be warranted.

It is all a new venture in Fiji, for no previous sub-division has been planned and will later be administered in precisely this way. In the context of Fiji much of it is theory based on the calculations of the drawing board and of the planners. Although it does take account of advice and experience elsewhere, how it works out in practice has, of course, yet to be seen; and this will in large measure depend on that intangible factor which has upset so many carefully planned projects—the human element.

This at least can now be said—Fiji has awakened to the need for action in helping to house the urban worker and, in its present circumstances, is, we feel, beginning to go the right way about doing so.

Promising New Species In SPC Fishponds

Two further species of edible freshwater fish selected for possible introduction to Pacific territories by the Commission's fisheries officer, Mr. H. van Pel, are showing promising results. They are part of a consignment of fingerlings he brought by air from the Philippines a year ago and released in experimental fishponds near Nouméa.

Eight females of one species, sepat Siam, each carrying an estimated 8000 eggs, have been placed together with twelve males in a breeding pond with artificial nests. Spawning is expected to take place shortly.

The other species, known in the Philippines as dalag, were one and a half inches when introduced a year ago. Now from fourteen to sixteen inches long, their early release in a river is under consideration.

PICTURE CREDITS

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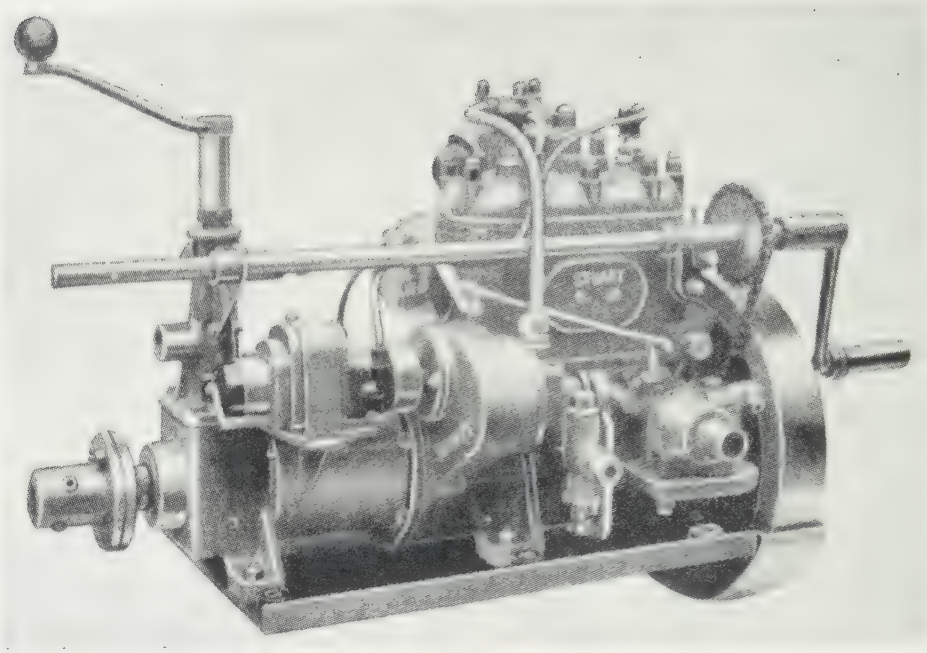


The Stuart model P55M 8 b.h.p. marine engine with reverse gear. A flexible, smooth-running twin, the P55M will operate for 1¼ hours at full load on a gallon of petrol.

Marine Engines For Pacific Fishermen . . . . (3)

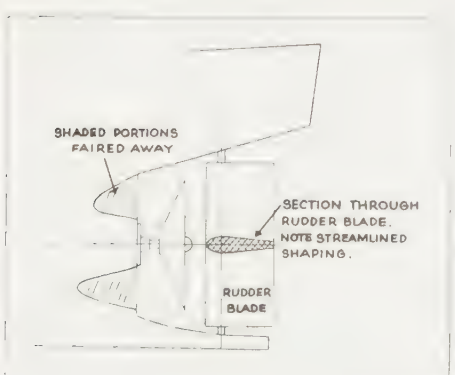
Pointers on selecting engines, the importance of fairing propeller posts and rudder blades, and proper maintenance of stern-tube bearings are among topics the author—a leading Australian naval architect—discusses in this concluding instalment.

By ARTHUR N. SWINFIELD

Engine Selection Pointers

What requirements would a naval architect or boat-builder consider as important if the engine were left to him for free selection? For my part, the following would deserve special thought, according to the type of vessel under consideration.

Firstly, let us consider an open boat of say 16ft. length, fitted with a deadwood and an outboard rudder. The maximum economical speed would be 6 knots and the average about 5 knots.



In this instance one could select either a petrol or air-cooled diesel engine of about 4 h.p. If cost had to be closely watched the petrol motor would be selected and fitted with a small clutch. Reverse gear would not be required as these are expensive units. However, if the launch was intended for constant work, then the air-cooled diesel fitted with variable-pitch propeller would be very seriously considered. An inexpensive unit would be a 4 h.p. outboard motor. Installation costs would be nil, and performance excellent.

Secondly, we have perhaps a 20ft. fishing vessel, somewhat heavier in weight, with a bigger beam and draught. The required speed would be say 7 knots and this vessel would be working hard all the while. An obvious choice in petrol motors would be a heavily-built marine engine of about 6 to 8 h.p. fitted with a good rugged reverse gear. Once again, if first cost could be ignored, then an excellent choice would be either the air- or water-cooled diesel of about the same horsepower.

Finally, a boat of over 20ft. becomes a much heavier proposition, requiring greater horsepower and more elaborate installation arrangements. For a working boat the diesel is the choice. Whether it should be air or water-cooled depends on the available space in the engine room. If space is limited then the water-cooled engine deserves special thought, but salt water cooling should be ignored. Fresh water should be used, with an outside cooling system for preference.

Horsepower, of course, depends on the speed required, and propeller revolutions depend on the propeller aperture available (propeller space) and the speed of the engine itself (the rule-of-thumb method mentioned in the last instalment. is useful here).

One very important thing to remember is that an engine can only give good performance with a good propeller, and a propeller can only perform in unobstructed water. Thick propeller posts and deadwood are to be avoided at all costs, as are thick rudder blades right behind the propeller itself.

(Continued on page 60)

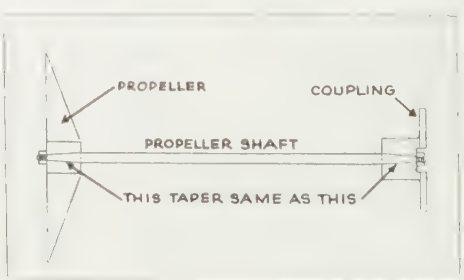


Fig. 1 (left). Careful fairing away of propeller post and rudder means higher speed. Fig. 2 (right). A tail shaft machine-tapered at each end to suit the propeller can be reversed later.

Left: Woman with elephantiasis of the arm. Above: Discarded empty coconut shells and tins partially filled with rain-water provide an ideal breeding ground for the day-biting Aedes mosquito which carries the filarial parasite.

Combating Filariasis In Polynesia

The author considers that filariasis in the Polynesian islands of the South Pacific, where it is widely prevalent, can be effectively controlled by instituting simple village sanitation measures. Essentially these comprise the elimination, or proper protection, of domestic rain-water containers, and removal of all coconut shells and discarded tins.

By M. O. T. IYENGAR*

FILARIASIS is a disease which is widely prevalent in the Polynesian islands of the South Pacific. On several its incidence is as high as in some of the most heavily-infected parts of the globe, or even higher.

Filariasis is a preventable disease. "If preventable, why is it not prevented?" is the question that comes to our minds. As against this I have on more than one occasion been asked if it is of such importance to the well-being of an island population that an all-out effort should be made to control filariasis. An administrator once argued that he did not feel justified in incurring expenditure on the control of a disease which rarely killed, and which in his view did not cause any considerable sickness in the community.

The apathy towards filariasis control is largely due to lack of appreciation of the ill-effects the disease has on the well-being of a community. It is true it is only rarely a direct cause of mortality. It is also true that its ill-effects on a community are insidious and difficult to assess. But just because of this we cannot assume they are negligible. As I shall try to show, the disease has a very considerable influence on the physical and mental well-being of the individual and his family, and has definite economic consequences as well.

The common late manifestation of filariasis is the development of gross swelling of parts of the body such as a leg, arm, or the genitals. Such a condition is known as elephantiasis. The disease also manifests itself in other forms; for example, it is known that a large proportion of the adult male populations of endemic areas suffer from hydrocele.

Incidence Of Elephantiasis Often High

The incidence of elephantiasis is often very high. On one island in the South Pacific as many as 9 per cent. of the inhabitants are known to be affected. On several others, incidence is estimated at about 5 per cent.

Quite apart from the disfigurement caused by the disease, the weight of the affected part renders a person incapable of performing his normal work. In such people, physical strain precipitates fever attacks. Thus the extent of physical incapacitation in a community as a result of filarial disease can be quite considerable.

Filarial disease is also known to have an adverse effect on the mental health of its victims. They are prone to attacks of mental depression that are often severe, especially when the genitals are involved.

Persons suffering from elephantiasis as well as those in the early stages of its development are subject to periodic attacks of filarial fever. As these develop at different periods in different persons, and do not assume an "epidemic" form like influenza or measles, one is apt to under-estimate the extent of sickness in a community due to this cause.

There is little doubt that filarial fever is responsible for a considerable amount of sickness among populations of Polynesian islands. Here, attacks are so common that the people recognise the condition by the local name of *mumu*. On one island 19 per cent. of the inhabitants are known to be subject to such attacks; on others, from 7 to 12 per cent. are sufferers.

These attacks recur at periodic intervals of from once a week in some persons to once every few weeks in others, and are often so severe as to confine the patient to bed. An attack may last from two to five days, after which the patient recovers, only to find that the fever recurs after a few weeks. For a few days after each attack the patient is weak and enervated. Neither during his

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Above: Oil-drums are widely used in the islands to store rain-water from iron roofs. Generally uncovered, mosquitoes breed in them prolifically. Right: Members of a women's group in the Cook Islands examine live filarial worms under a microscope. Author at right.

fever, nor for several days after, is he able to do any work.

Rural Communities Mainly Affected

In Polynesia the disease affects mostly the rural communities. There the families ordinarily depend for their day-to-day food supply on the produce of the gardens and plantations, which are often at some distance from the village. When the head of the family is laid up with filarial fever the plantations cannot be well looked after, garden produce cannot be collected, and the family may suffer from lack of food. When the mother of the house has the fever the children may have to depend on the kindness of neighbours for their food.

Filarial disease undoubtedly causes considerable difficulties to the individual and the family, besides loss of manpower to the entire community.

Filariasis Actually A Major Problem

When we realize these facts, namely the incapacitation, mental depression and sickness caused by filarial disease, together with the lowering of efficiency, loss of manpower and resulting poverty, it will be recognized that filariasis is a problem of significant importance from the economic as well as the social point of view. Administrators as well as people would then realize how very important it is that an all-out effort should be made to control the disease wherever it is prevalent.

Cause Of Filarial Disease

The parasite causing filarial disease is the tiny filaria worm. Its young, which occur in large numbers in the blood of infected persons, are picked up by mosquitoes feeding on them. About two weeks later, when the baby worms have passed through certain stages of development within the mosquito, they are capable of entering a new host when the mosquito bites again.

Although in the Polynesian islands there are several kinds of mosquitoes, only one particular kind, known as Aedes, is capable of carrying the filarial parasite from man to man. It bites only during daytime, and is easily recognized by the black and silvery-white markings on its body and legs. The infection cannot spread in any other way, or in the absence of this particular mosquito.

The development of filarial disease is, however, a fairly complicated process. At first the person becomes infected through the bites of infected mosquitoes, though at this early stage he shows no signs of the disease. Subsequently, when as a result of continued exposure to further infection through the bites of infected mosquitoes he reaches the stage of becoming heavily charged with filaria worms, he becomes prone to attacks of filarial fever, which finally culminate in the development of elephantiasis. This process usually involves several years of continued re-infection.

Thus we have two stages in the development of filarial disease; first, the stage at which the infection is present in man but the infected person shows no signs or symptoms of filarial disease; and second, the stage at which the disease manifests itself in the form of filarial disease and subsequently of elephantiasis.

A person in the early stage of filarial infection may continue to remain healthy all his life if he does not expose himself to further infection through the bites of infected mosquitoes. Filarial disease develops only when the human body becomes charged with a large number of full-grown filaria worms; the baby worms liberated by the adult female worms cannot grow into adult worms unless they have passed through developmental stages within the body of the Aedes mosquito.

The population of any endemic area would be composed of, firstly, persons free from filarial infection; secondly, persons with filarial infection, yet perfectly healthy and without any symptoms of filarial disease; and thirdly, persons who have developed filarial disease.

Three Categories Of Islands

Likewise, the islands in the South Pacific may be grouped under three classes. The first comprises islands with communities entirely free from filarial infection; the second, islands having communities with filarial infection, but with little or no filarial disease; and the third, islands inhabited by communities with filarial disease.

The number of islands constituting the first group in the South Pacific is comparatively small. Here the vector mosquito may be totally absent, or its incidence in areas of human population very low—too low for effective transmission. Pitcairn Island is an example. Here the vector mosquito is present, and yet there is no filarial infection in the community.

In the second group a low density of vector mosquitoes occurs on the inhabited islands; a density which is sufficiently high to establish the infection in the community, but not high enough to produce the high intensity of infection necessary for the onset of filarial disease. The Tokelau Islands, the Tuamotus and the Australs are examples. On the islets on which the people live the density of vector mosquitoes is very low. Although these people often visit the uninhabited islands where a very high density prevails, and live there for short periods for the purpose of collecting copra, few of them ever develop filarial disease.

In the third group, on the other hand, because of the high prevalence of vector mosquitoes in and around the villages, there occurs constant contact between the vector and the human host, which serves to step up infection in man to

the level at which filarial disease manifests itself.

It will thus be seen that the essential factor for an appreciable prevalence of filarial disease in a community is the presence of a high density of vector mosquitoes in close association with human habitations. When both are not present, filarial disease is not a problem of consequence.

These observations show that it is *not* axiomatic that filarial disease occurs wherever the vector mosquito is present. Nor is it true that elephantiasis occurs in every community in which filarial infection is present. But it is invariably true that wherever a high density of the vector mosquito occurs in close association with human habitations, elephantiasis is of common occurrence.

Breaking Of Association Essential For Control

In achieving our objective of control of filarial disease, it is not the eradication of the vector mosquito that is necessary, nor even the eradication of the parasite in man, but the breaking of the chain of close association of high vector densities with man.

To a large extent the prevalence of vector mosquitoes in the vicinity of habitations is due to man-made causes. The Aedes mosquito breeds mostly in containers such as cisterns and barrels for storing fresh water, coconut shells and discarded food tins in which rainwater collects. While water containers breed the mosquito all the year round, the discarded coconut shells and food tins step up Aedes production during the rainy season, and for several months after.

The population of most of the Pacific islands suffer acutely from lack of fresh water supply. Excepting for a few relatively small areas provided with a piped water supply, the people depend on rainwater for drinking and domestic purposes. It is commonly collected and stored in barrels, less frequently in cisterns and tanks. Every house has one or more of such containers. The vast majority are not provided with lids, and consequently they breed Aedes mosquitoes in large numbers all through the year.

Copra-making is an important occupation of Pacific people. After removal of the kernel the coconut shells are left in the open, near houses, or thrown into nearby bush. In this way large numbers accumulate in and around the villages. Grated coconut is an important item in the Polynesian style of cooking. Several nuts are used for this purpose every day by each family, and again the shells are left in backyards or thrown into nearby bush. Similarly with nuts commonly used for drinking to supplement a meagre supply of fresh water.

When rain-water collects in them, all these shells form prolific breeding places of the Aedes mosquito.

The Man Behind it All . . .

The development of the Territories of the South Pacific is an example of the spirit of the pioneer builders of all nations.

Those men met, and overcame, obstacles not found in other parts of the world; yet there is still more work for men with a pioneering spirit who are prepared to leave the beaten track of better developed and more settled places.

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Tinned foods form an important article of diet for the Polynesian family, and the discarded tins find their way to the nearby bush where they also collect rain-water and form favourite breeding places for the Aedes mosquito.

Control Of Filariasis

Thus it becomes apparent that control of filariasis in South Pacific islands is merely a matter of carrying out simple village sanitation measures, essentially the elimination, or proper protection, of domestic rain-water containers, and removal of all coconut shells and discarded tins.

ELIMINATION OF RAIN-WATER CONTAINERS: Provision of a piped water supply—possible on many islands by tapping streams or sub-soil water—would eliminate the need for domestic water containers.

As an alternative for low-lying atoll islands, large rain-water catchments could be erected, or the roofs of existing church buildings utilized and the water stored in mosquito-proof cisterns and tanks. Domestic water containers, if these cannot be entirely eliminated, should be of a standard design and provided with proper lids.

DISPOSAL OF SHELLS AND TINS: The collection and disposal of coconut shells and discarded tins within the village, and for about 120 yards around it, is a matter which could well be carried out by the people themselves. It would, however, need stimulation through educative propaganda and the full-time attention of a filariasis control inspector appointed to co-ordinate and direct the efforts of the villagers.

This procedure would not be new to Pacific islanders, most of whom observe village "clean-up days" at periodic intervals. What is needed is to stimulate, coordinate, and direct public effort.

The two measures suggested above offer more permanent results in filariasis control in the South Pacific islands than any other method I know. They also offer collateral benefits such as an adequate and protected water supply, village cleanliness and freedom from day-biting mosquitoes.

Filariasis Control By Drugs

At this stage I may mention another method often advocated for the control of filariasis which has been tried in two or three areas in the Pacific. It consists of the treatment of the *entire* population with a drug known to reduce, or suppress, the number of baby filaria worms circulating in the blood, to render the infected persons less infective to the mosquitoes that may feed on them. This method, to be effective, involves the administration of the drug three times a day on one day in every month to the entire population (inclusive of healthy

persons) for a prolonged period of five years or more.

To ensure that everyone receives the treatment the drug must be administered individually under proper supervision. This entails expenditure on a large staff to trace people and administer the drug, in addition to the cost of the latter, which is expensive. On one island the cost of such a scheme was one pound sterling per head of population per year.

Apart from the question of the enormous cost of this scheme, which few territories could afford, there are practical difficulties. It is not always possible to treat *every* member of a population, especially as healthy persons are normally averse to drug treatment. They may agree to it for some time, but not for long.

Further, it is not known for how many years such monthly treatments of the entire population need to be continued to reach what we may call the "end-point" at which the scheme could be discontinued with an assurance of safety. Even apart from these considerations, an aspect which is repugnant to my feelings is the idea of treating people as passive subjects.

It is increasingly being realized that drug treatment of populations is not the proper approach to the question of filariasis control. I am not alone in this view. Several authorities, after extended trials with this method, are now fully convinced that control of the transmitting mosquito by community effort, supported by government, offers the most efficient and economical way of filariasis control in the South Pacific.

Picturesque Rabaul

(Continued from page 18)

schemes are being developed by the Administration. Also, better utilization of land already in use is expected further to increase production.

Rabaul A Modern Town

Rabaul's population is now 1,600 Europeans, 1600 Asians, and some 100 people of mixed race. In the surrounding area the population is about 51,000.

Rabaul was the pivot of Japanese strategy in the south-west Pacific campaign, and was severely damaged. After the war the town was rebuilt, and continues to flourish as the main economic centre of the territory.

There is much of interest to be seen by the visitor. Modern buildings have been built along the town's tree-lined streets. There is a wide range of shops, as well as hospitals, schools, pre-school centre, modern cinema, and extensive sporting and recreation facilities.

At Toboi, on the north side of the harbour, the dock area is served by newly-built wharves. Along the western side of the harbour are factories and workshops, the most recent addition being a new coconut oil mill.

There are many good views to be had

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PASCALL SWEETS MAKE LIFE SWEETER

of the two nearby volcanoes of Matupi and Vulcan. At the base of Vulcan is the spot where the Japanese first landed in 1942. Other relics of the war include caves carved into the hills by the Japanese. A relic of another occasion is the millstone outside the Commonwealth Bank—a reminder of the Marquis de Rey expedition that attempted to settle in New Ireland in the latter part of the nineteenth century.

There are some 500 miles of trafficable roads connecting Rabaul with points throughout the Gazelle Peninsula, and Rabaul has large fleets of cars, taxis and trucks. For transportation to many of the coastal areas, small vessels such as schooners and motor launches are in use.

Several important settlements lie near Rabaul. One is Kokopo, about 20 miles to the south, along a good road skirting the harbour. The centre of a rich agricultural area, it has a large population of native people.

All New Britain plantations are serviced through Rabaul. It is also a port of call for all shipping servicing the territory, and for ships running between Australia and the east. Scores of small coastal ships run between the port and the plantations.

Rabaul is now also an important airport. Air services link it with Australia through Lae and Port Moresby, with the north coast of New Guinea, and with Manus Island, New Ireland and the Solomons.

Dental Services In U.S. Trust Territory

(Continued from page 46)

school for Micronesians on Guam. This school was operated until 1950, when the Trust Territory students were transferred to the medical and dental school at Suva, Fiji, to complete a four-year course. Between 1951 and 1955 nineteen Micronesians graduated as dentists from the Suva school, and all are employed in the Trust Territory. In addition there are nine assistants, graduate laboratory technicians and dental aides.

Until 1954 four American dentists worked in the territory. Gradually they were replaced by trained Micronesians. At present, I am the only American left, staying on as Director of Dental Services. In other words, I am the sole exception to a dental service manned entirely by Micronesians. We have held firm to the aim of letting them "do for themselves".

The total cost of operating the Dental Department in 1957 was $30,000 (this was for Micronesian staff salaries, supplies, equipment, field trips, etc.).

Oral Hygiene Education Programme

In view of the high caries rate found in all districts except Yap, a series of school lectures was arranged and an oral hygiene education programme launched. This included the preparation and dis-

tribution of a pamphlet and booklet on the care of the teeth. As well, the children's teeth were painted with a caries preventive medication, and concentrated fish liver oil was distributed to supplement a diet deficient in protein.

A survey was recently made to determine the resuts. Children between the ages of 7 and 17 were surveyed in the districts of largest population—Truk, Marshalls, Ponape, and Palau. 983 cavities in the permanent teeth of 1070 children, or an incidence of slightly less than one per child, was found.

We regard this finding as strikingly significant, as it represents a 75% reduction in the caries rate of four per child of ten years ago.

Services Provided During 1957

The following is a summary of the most important services provided in all districts in the calendar year 1957:

Total number of extractions	6,855
Dentures of all kinds	312
Fillings of all kinds	2,564
Fixed and removable bridgework	103
Number of children treated for caries prevention	3,421
Total number of patients	13,837

The number of patients is of particular significance when compared with the total population of Micronesian residents in the area under Department of the Interior administration. It becomes even more significant when the vast distances that must be covered to reach patients are considered.

More Installations And Personnel

We are continuing to set up permanent and semi-permanent dental installations at various spots in the territory. Old equipment is being replaced as funds permit. A valuable recent acquisition was a number of portable electric generators which allow us to provide laboratory service in the field.

The Dental Services programme provides for the training of additional dentists so that outlying islands can receive more frequent service. This is dependent on the availability of qualified candidates. Plans also include the training of some dental hygienists.

Meanwhile, a constant effort is made to keep Trust Territory dentists up-to-date. Last year all Micronesian dentists completed a two-month post-graduate course in modern techniques at the United States Navy Dental Clinic on Guam.

Our basic aim rests on the belief that dentistry can benefit the islanders only if they have a good understanding of oral hygiene. That is what the Dental Services staff is attempting to give them. In addition, the Administration continues to provide technical training for a selected number of Micronesians, and the equipment and facilities to take advantage of this training.

YESTERDAY'S WEALTH . . .

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Feather money — from Santa Cruz, this form of currency was a necessary part of a bridal dowry

Flying fox jaws — used for ornamental or trading purposes by Fijian natives

Whale's tooth — Fijian natives wore these as pendants until needed for trading.

Stone money — used in the Caroline Islands, often larger than 10 or 12 feet in diameter

Head money — flying fox fur string wound round a wood[en] [fra]me was an early form of currency in the New Caledonia

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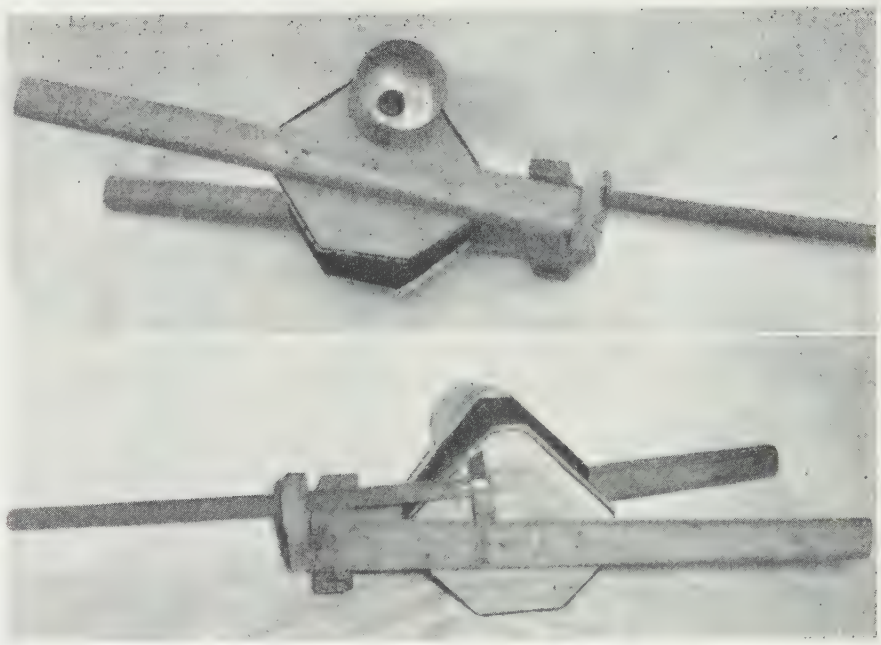

Fig. 1—The completed duster, front and rear views.

Home-made Crop Duster For Smallholders

This article describes how to make and use a low-cost bellows-type duster for applying insecticide powders to crops of several acres. Developed in Indonesia, it is enabling smallholders there to use latest techniques for protecting their crops against pests and diseases.

By EDGAR DRESNER*

MANY farmers in countries which are being developed, as well as many home gardeners in more developed countries, have not been able to share the benefits of modern insecticides because of the high cost of application equipment. These people are willing to sacrifice efficiency for an inexpensive product.

A low-cost bellows duster as illustrated in Fig. 1 and its construction are described below. This duster was developed in Indonesia under the U.S. International Co-operation Administration programme in economic entomology. Samples were given to Indonesian agricultural extension agents for distribution to farmers and village carpenters. Within a few months, thousands of dusters were made and sold in village shops.

Farmers are using these dusters to apply insecticides to their rice seedbeds, vegetable crops, and even to rat holes, for the control of that pest. A farmer with a seedbed large enough for one hectare[1] of rice will require less than one hour to treat the field; most of the farmers do it in about half-an-hour. On an average, a little more than one kilogram[2] of dust can be delivered with this duster in an hour.

All the materials required for making these dusters are readily available.

Experience indicates that the rubber tubing used will last for more than six months before needing replacement. Rubber tubing from a jeep or a regular passenger car is much better than that from a truck. With the former, the duster is lighter and less tiring to use. Very light wood is preferable.

In tropical countries bamboo tubing is usually available in the villages. The thin-walled kind is recommended for making the discharge or outlet tube of the duster. If bamboo tubing is not available, thin sheet metal from used food containers can be flattened and then rolled into a tube of the desired diameter. The rolled sheet metal tube is lighter (Fig. 2A); it is considered by some to be better than a bamboo tube of the same size.

Most of the outlet tubing mentioned in this description is 2 cm. in diameter; the selection of the diameter of the tubing depends on local availability of tools used for boring. The boring can best be done with a brace and bit; if this is not available, it can be done by burning with a red hot poker or even drilling with a small knife blade.

The first model of this duster was

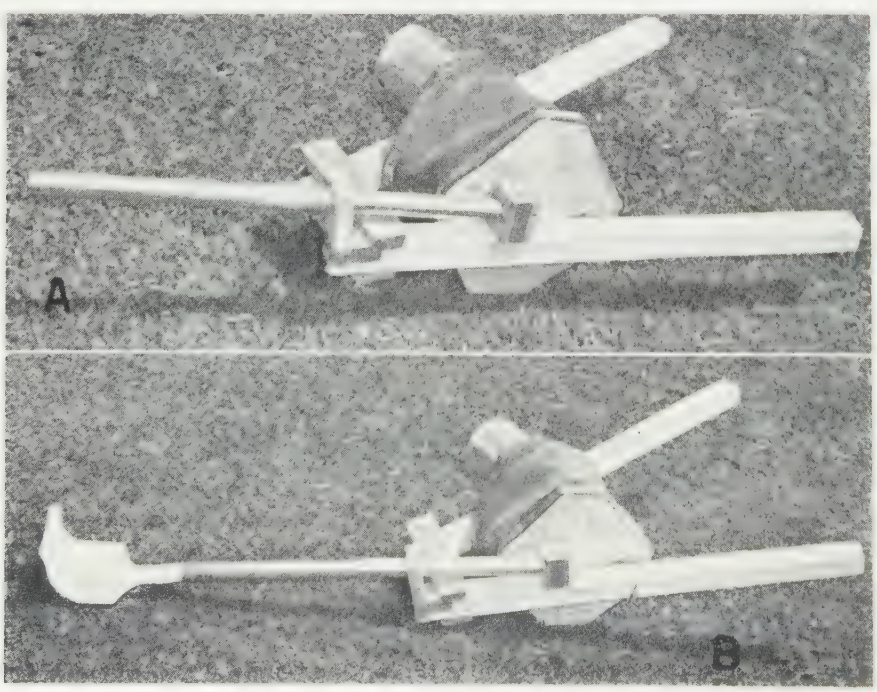

Fig. 2—A: Duster with metallic outlet tube. B: Duster with deflector scoop attached.

* United States International Co-operation Administration Mission, Djakarta, Indonesia. This article, which appeared in the *FAO Plant Protection Bulletin* for March 1958, is reprinted here (in slightly adapted form) by permission.

[1] One hectare equals 2.471 acres.
[2] One kilogram equals 2.2 pounds.

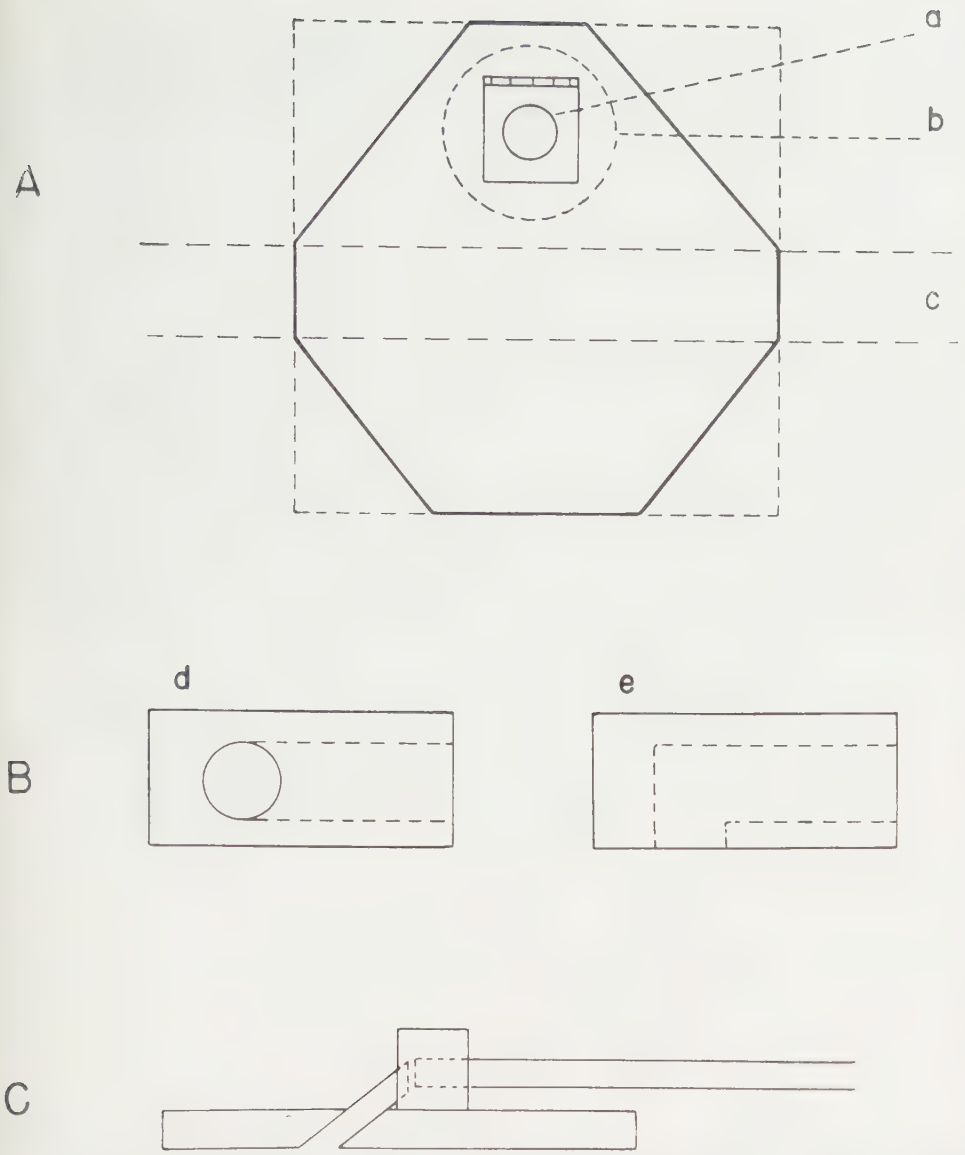

Fig. 3—Patterns for making wooden pieces for the duster. A: Side board for the bellows should be cut from a wood piece 1-2 cm. thick and about 17 cm. square. On it a flap valve (a) should be affixed on its inner surface, and a tin can (b) with a hole at the bottom and a handle (c) affixed on its outer surface. On the other side board a hole should be made for the outlet tube. B: Rear tube housing block showing the position of the hole from side view (d) and top view (e). C: Rear tube housing block with a slanted opening for the outlet tube, which can be made by farmers without a drill.

made with round side discs. It was found that this was difficult to cut, and a change to the straight-sided model was made. This model, if made with light wood and a jeep tube, will weigh a little less than 1 kilogram when complete.

The circumference of the wooden sides of the bellows has to be altered to fit the variations in the size of the rubber tubing used. The wood should have a circumference 3 to 6 cm. greater than the auto tubing. Only the wooden sides and the length of the metal binding strips need to be changed in accordance with the size of the tubing used.

A right-handed man will usually prefer to have the outlet tube on the left side; a left-handed man will prefer the opposite. Directions for construction with jeep tubing for a right-handed man are given below in detail. All measurements are in centimetres.

Wood Pieces: Side boards of the duster are of wood 1 to 2 cm. thick; for use with a jeep tube the side boards should be about 17 cm. square. Fig. 3A shows the pattern for cutting these pieces. The inside surfaces should be smoothed, especially near the flap valve.

Rear tube housing blocks can be mass-produced according to Fig. 3B, if a drill is available. For farmers who make this duster without standard drills, the pattern in Fig. 3C with the slanted opening will probably work somewhat more efficiently. The handles are pieces of wood about 45 x 3.5 x 2.5 cm. Longer handles make the work more tiring. The handles can be smoothed and the edges bevelled to make gripping more comfortable.

Three blocks 10 x 2.5 x 1.0 cm. are needed for the front pieces. Two of these are axle housings; the third is the front tube housing. The front tube housing hole should be larger than the tube to be used; a "V" notch at the side of the hole will allow for the placement of a small wedge.

Rubber Pieces: The flap valve is a small rectangular piece of rubber cut from the tread portion of the tube, to be affixed on the inner surface of the side board. It is nailed only at its top because it is intended to flap and permit entry of air or dust. When the bellows is pumped, the flap will close automatically.

The rubber piece for the bellows should be cut as a sector from the auto tube, with the angles on both sides about equal. Patches on the used tube will not interfere with the working of the bellows. The circumference of the tubing should be about 3 to 5 cm. less than that of the side pieces. The small nails used to fasten the bellows should be about 1 cm. apart.

Metal Pieces: A small tin can such as is used for canned milk or cigarettes makes an adequate dust funnel, which is to be affixed on the outer surface of the side board opposite the flap valve. A hole about 2 cm. in diameter is made in the bottom but does not necessarily have to be in the centre. If too small a hole is used, loading the duster is more difficult. This tin should *not* be covered.

Fig. 4—Pattern for making the deflector scoop for attaching to the outlet tube of the duster.

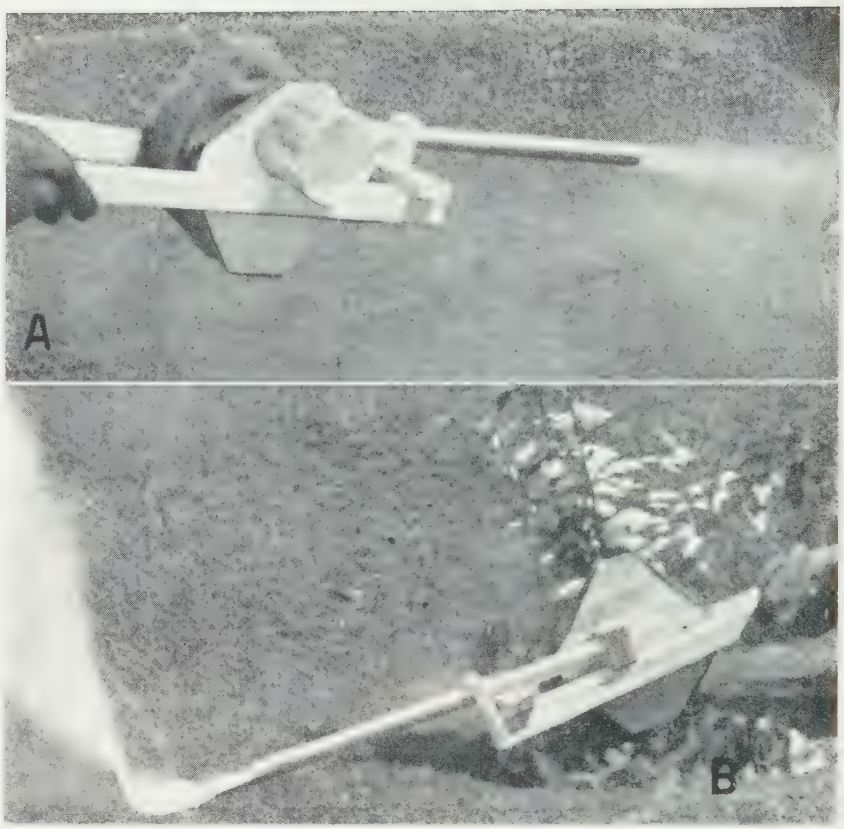

Fig. 5—The bellows duster in use. A: Without attachment for ordinary use. B: With a deflector scoop attached for dusting the underside of leaves of certain crops, such as cabbage. Note the amount of dust being discharged and the angle of discharge.

The outlet tubes can be made from thin metal sheet such as is used for food tins; these tubes can also be made from thin-walled bamboo.

The bellows is secured to the side pieces by thin strips, for which usually metal is used, though some farmers have used rattan. The axles, which permit movement of the handles, are nails bent at the end, or holes can be drilled in the two front wooden pieces and the handles and baling wire used.

Assembly

The flap valve, the rear tube housing block, the loading funnel tin and the handles are nailed in place before the bellows tubing is nailed in place. The front tube housing block is nailed to the left handle before being attached to the side board.

The bellows tube is stretched evenly over the side pieces before being nailed in place. After the bellows tubing is nailed, then the axles should be placed in position. Some people make only one of the axle positions moveable.

The outlet tube is put in position and secured with a wedge. The dusters in the illustrations do not have a wedge but the front tube housing is very tight and it is difficult to place the tube in position. If the rear tube housing opening is a little large, the dust leakage from this point can be reduced by wrapping the tube with thread, string, or even rubber bands.

Use Of Duster

The duster is used with the loading tin and outlet tube above the handle (Fig. 5A). To load the duster, it is to be placed on its side with the loading tin up; up to 200 cc. of dust can be added at one filling. A stick may be used to open the flap valve, if necessary. By tapping the duster, the dust will fall in.

For rapid dusting of a large field, the dust should be applied when there is a light breeze. If the operator stands with his back to the breeze, the air currents will carry the dust across the field. Two kilograms per hour can be applied by this method. Ten kilograms or more are usually required per hectare. It is preferable to apply the dust when the plants are still wet from rain or dew.

Accessories

Outlet tubes of various lengths may be used. The very short tube is generally used for treating rice seedbeds and field crops; the longer one is used for treating small trees and rat nests. The longer tube is also used with a deflector scoop attached for treating the underside of leaves, such as cabbage (Figs. 2B, 5B). Fig. 4 gives a pattern for making the scoop.

Marine Engines For Pacific Fishermen

(Continued from page 50)

Thick rudder blades are not such a hazard if properly streamlined away, and in fact can be regarded as better than a flat plate if carefully proportioned. Figure 1 shows what is meant. A thick rudder blade which presents a wide face right behind the propeller adversely affects the speed of the boat considerably. This can be rectified by streamlining the front and back edges of the rudder as shown in the sketch.

The propeller post should also be faired away so that unobstructed water flows as direct as possible to the propeller. This is very important for efficient performance.

Stern-tube bearings should be kept in good order. A worn bearing means a worn shaft—and shafts are very costly items. Many "stern-tube" bearings are made of white metal, lubrication being provided through a grease nipple inside the boat. This method is quite in order provided the grease is kept up to the bearings.

Another method is to use a white metal bearing on the inside end of stern tube and an impregnated linen bearing on the outside end.

These impregnated linen bearings are "kind" to a shaft—and find wide use throughout the marine world. "Novasteen" and "Tufnol" are two very well-known makes, and in both instances lubrication is maintained by use of seawater. However, when installing such bearings, always enquire from the manufacturers exactly what clearances are necessary to give efficient performance.

Incidentally, while on the subject of stern-tube bearings, it would be interesting to note that the inner bearing should never be a very close fit if a packing gland is employed forward of the bearing. The gland should be slack enough to allow a *slight* drip of water through into the boat, and the bearings should be from 8 to 15 "thou" clear of the shaft. This avoids overheating at the bearing assembly, without undue play between the shaft and the bearing.

In conclusion, it might be helpful to remember that if a tail shaft is machine-tapered at *each* end to suit the propeller, and the coupling likewise fitted to each end (before installation) then it is always possible to reverse the tail shaft and so perhaps re-position the worn sections on the original shaft (see Figure 2). The only bad feature is that the coupling would have to be modified to suit the taper employed. However, the slight extra cost is well worth while when the cost of a new shaft is taken into consideration.

Conference Of Pacific Island Peoples

(Continued from page 16)

from French-speaking territories. Close to the Conference Hall will be a press room for visiting journalists who will report the Conference proceedings, a post office and a bank.

The Secretary-General, the Commission's executive officers, and the secretariat officers responsible for the Conference will have the use of offices in the school's administrative block, an attractive two-storeyed building set in colorful flower gardens.

Recreation facilities for those attending the Conference will include a spacious area for dancing and other entertainments, playing fields for football, baseball and basketball and a swimming beach.

A feature of the Conference will be an exhibition of indigenous arts and crafts.

Administrator Will Welcome Delegates

At the opening ceremony on April 29, delegates and others will be welcomed by His Honour the Administrator of Papua and New Guinea, Brigadier D. M. Cleland, C.B.E. The Conference will be formally declared open by the Senior Commissioner for Australia on the South Pacific Commission, Mr. J. R. Halligan, who will be chairman.

Main topics that delegates will discuss relate to the economic and social development of the region. As at previous Conferences, discussion will be initiated by introductory papers prepared by various delegations and circulated among them in advance for study.

These items, and the delegations preparing the introductory papers on them, are as follows:

Problems resulting from the impact of participation in economic development, with respect to land tenure and the growing of permanent crops
PAPUA AND NEW GUINEA.

The study of the role and function of customs and beliefs in relation to infant and maternal welfare
NETHERLANDS NEW GUINEA.

The impact of the modern technical and industrial world on the life and culture of South Pacific peoples
AMERICAN SAMOA.

The place of recreation, including sport and youth activities, in the community ..... FIJI.

The extension of tourism in the Pacific region and the economic and social implications for the people.
FRENCH POLYNESIA.

Broadcasting in the life of Pacific peoples ..... WESTERN SAMOA.

The training of local leaders for participation in aided self-help projects
BRITISH SOLOMON ISLANDS.

FOURTH SOUTH PACIFIC CONFERENCE

Delegates, Alternates And Advisers: Observers

Participants

AMERICAN SAMOA	High Chief Leiato	Delegate
	High Chief Sotoa	Delegate
	Talking Chief Tuato'o	Alternate
	Talking Chief Saleapaga	Alternate
	Mulitauaopele	Interpreter
BRITISH SOLOMON ISLANDS PROTECTORATE	Mr. Silas Sitai, B.E.M.	Delegate
	Mr. Salana G'aa, B.E.M.	Delegate
	Mr. V. J. Andersen, M.B.E.	Adviser
CONDOMINIUM OF NEW HEBRIDES	Mr. John Kalsakau	Delegate
	Chief Thompson Tangarasi	Delegate
	Mr. Richard Angeloni, M.B.E.	Adviser
	M. Jacques Herry	Adviser to all French delegates
COOK ISLANDS	Mrs. Teupokoina Morgan	Delegate
	Mrs. Margaret Taripo	Delegate
	Mr. Tuakeu Puna	Alternate
	Mr. L. K. Pitt	Adviser (Cook Islands and Niue)
FIJI	The Hon. H. B. Gibson, O.B.E.	Delegate
	The Hon. Semesa Siki Vou	Delegate
	The Hon. Dr. Sahu Khan	Delegate
FRENCH POLYNESIA	Mme. H. Jacquemin	Delegate
	M. E. Le Caill	Delegate
GILBERT & ELLICE ISLANDS	Te Tabunawati Takoa	Delegate
	Te Reuben K. Uatioa	Delegate
	Henry Faati Naisali	Delegate
	Iupasi Kaisala	Delegate
	Mr. G. Bristow	Adviser
GUAM	Mr. Richard Taitano	Delegate
	Mr. Vicente Bamba	Delegate
NAURU	Head Chief Hammer de Roburt	Delegate
	Councillor Raymond Gadabu	Alternate
	Mr. G. A. Pittman	Adviser
NETHERLANDS NEW GUINEA	Mr. Marcus Kasiepo	Delegate
	Mr. Toon Meset	Delegate
	Mr. Eliezer Wettebossy	Alternate
	Mr. Martinus Janam	Alternate
	Mr. Dick Sarwon	Alternate
	Mr. Pieter Merkelijn	Adviser
	Mr. C. H. Stefels	Interpreter/ Translator
NEW CALEDONIA	Mr. Pierre Isamatro	Delegate
	Mr. Pierre Ketiwan	Delegate
NIUE	Mr. Leslie Rex	Delegate
PAPUA AND NEW GUINEA	Mr. Kai Kai Ivasi	Delegate
	Miss Nancy Gire	Delegate
	Mr. Raymon	Delegate
	Mr. G. A. Kassi	Delegate
	Brother Peter Hilary	Alternate
	Mr. Tovin Tobaining	Alternate
	Mr. Kondon-Akau'undo	Alternate
	Miss Philo Gamauri	Alternate
	Mr. J. K. McCarthy, M.B.E.	Adviser
	Mr. Elliott-Elijah, M.B.E.	Adviser
	Mrs. Lila Matelau	Adviser
	Mr. Reuben Taureka	Adviser
TONGA	H.R.H. Prince Fatafehi Tu'ipelehake	Delegate
	Mahe 'Uli'uli Tupouniua	Delegate
TRUST TERRITORY OF THE PACIFIC ISLANDS (under United States administration)	Mr. Napoleon D. Fang	Delegate
	Mr. Kasiano F. Joseph	Delegate
	Mr. Olympio T. Borja	Delegate
	Mr. Elias P. Sablan	Alternate
	Mr. Frank J. Mahony	Adviser
	Miss Myrtle Holmstad	Adviser
WALLIS & FUTUNA ISLANDS	Rev. Father Vittolio	Delegate
	Mr. Sosefo Makape (dit Papilio)	Delegate
WESTERN SAMOA	Miss Tiresa Hunter, B.A.	Delegate
	Mr. F. Sosene	Delegate

Observers

Rev. G. G. Carter,	Commission on Overseas Missions and Inter-Church Aid of the National Missionary Council of New Zealand.
Dr. J. M. Cruikshank,	World Health Organization.
Professor J. A. Barnes,	Australian National University.
Very Reverend James Dwyer,	The Apostolic Delegation, Australia.
Dr. H. Coolidge,	Bernice P. Bishop Museum and Pacific Science Board.
Dean Knowles A. Ryerson,	Pacific Science Association.
Dr. A. Capell,	National Missionary Council of Australia.

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From the Conference will emerge recommendations by delegates for consideration by the South Pacific Commission. Commissioners of the six member governments (Australia, France, the Netherlands, New Zealand, United Kingdom and the United States of America), who will attend the Conference as observers, will consider these proposals at a special session of the Commission that will be held immediately the Conference ends.

Following the last Conference held at Suva, Fiji, in April 1956, delegates put forward a number of proposals for the further economic and social development of the region. At the coming Conference a progress report on action taken on these will be tabled for the consideration of delegates.

Fiji Tourist Industry Flourishing

(Continued from page 20)

local administration and to avoid such complications, all Fiji observes the date to the west of the meridian line).

A Robinson Crusoe Cruise

Fiji's second biggest island, Vanua Levu, which is an important sugar producing area, also possesses some striking tourist attractions, including the 50-mile Hibiscus Highway, which runs through beautiful undulating country from Savusavu to Buca Bay. From its principal town, Labasa, the Grand Eastern Hotel runs a rollicking Robinson Crusoe cruise, which includes a trip on a raft and a night on a desert island.

Statistics Illustrate Development

Statistics are not a particularly appealing part of tourist information, but those interested in the development of tourism in Fiji will be interested in the following, which shows how quickly and strongly the tourist industry has developed.

In 1949, the number of visitors using hotel accommodation in Fiji was 1775. Their estimated spending was £34,590. By 1958 the number of visitors had multiplied over six times to 10,638. Spending has multiplied not far short of 20 times. It reached over £670,000.

To be added to this for the 1958 figures are over 25,000 transit visitors by air who are estimated to have spent over £42,000, and 15,000 transit passengers by sea whose estimated spending was in the region of £50,000. Expenditure by crews of ships and aircraft would, it is believed, bring the total spending into the region of £800,000.

Government interest in the tourist industry is strong. The former Governor, Sir Ronald Garvey, was its keen supporter, and advocated measures to assist investors who wished to build hotels in Fiji.

His successor, Sir Kenneth Maddocks, speaking at his first Legislative Council meeting last November, said:

"The Colony's economy can derive great benefit by the expansion by all possible means of the tourist industry. Tourist spending is likely to exceed £800,000 this year, and with the growing popularity of foreign travel, could increase greatly if we can give our visitors the accommodation and facilities they need. Local enterprise has done, and is doing, a great deal to provide more hotel accommodation, but we need not only to encourage the investment of local funds, but to attract capital from outside the Colony. Efforts will be made to encourage tourism not only in Viti Levu, but in Vanua Levu and Ovalau."

Government Help For Hotel Builders

Sir Kenneth went on to refer to the new Hotels Aid Ordinance. Under this law, which is now in operation, financial assistance is given by Government to people who build hotels costing £75,000 in Suva or Lautoka, or £60,000 in other areas in the Colony. Aid is also provided for hotel extensions costing £20,000 or more.

The assistance takes the form of (a) a grant, in lieu of customs concessions, consisting of ten per cent. of the amount spent on building materials and hotel equipment, and (b) the privilege of writing off the whole of the capital expenditure on new building (less the cost of land and the grant in lieu of customs concessions) against income from the hotel in any five out of the first eight years, commencing with the year of completion.

This hotel aid system is in operation for five years from January 1st this year.

Tourism No Longer "Infra Dig"

The value of tourism to Fiji was stressed by the Financial Secretary, Mr. E. R. Bevington, in his speech to the Legislative Council, when presenting the 1959 Budget. He conceded that part of tourist spending went into the purchase of such things as trinkets and whisky, but stressed that a great deal stayed in Fiji as payment for services. He said:

"We do know now that our tourist industry is giving us substantial help in paying our way. Some other industries are in difficulties, but in the main we are fortunate. I stress the importance of tourism because there we have room to manoeuvre which we have not in some other of our industries. Government has shown it is keen to help tourism by the Hotel Aids Bill.

"There were days when there was some opposition to tourism in this country, but now I am sure those days have passed. I sincerely hope that the old feeling that there is something 'infra dig' about tourism is stone-cold dead."

Undoubtedly, Fiji now is all for tourism.

PACIFIC READING

Material in this section is contributed by the South Pacific Commission Literature Bureau. Any enquiries relating thereto should be directed to Box 5254, G.P.O., Sydney, Australia.

Notes and News

B.S.I.P. Mobile Library. The seventeenth (1957) session of the South Pacific Commission authorized a grant of £stg.1000 to the British Solomon Islands Protectorate "to assist with the establishment of one (or two if possible) travelling libraries for use by Solomon Islanders, and as a pilot project".

The Literature Bureau undertook the task of advising and assisting the Protectorate Government in organizing this library. Commencing without a precedent, and with very little guidance, the Bureau was faced with a multiplicity of problems—in selecting suitable books to attract and satisfy Solomon Islanders at varying stages of reading ability; in designing and constructing suitable strong, durable and waterproof book containers; and in devising eight forms and two rubber stamps to facilitate the organization, operation, and supervision of the library.

Recently, after almost a year's work, the Literature Bureau finalized the setting up of this library, and in early March arranged for its shipment to Honiara. In its final form the library comprised 2494 books (1108 titles) and these were packed into 24 library boxes each containing approximately 100 titles. In the above illustration, the contents of a typical book box are shown displayed in front of the complete library.

It is proposed shortly to publish the story of this mobile library in greater detail to assist other territories faced with similar problems in the development of their own library services.

The complete B.S.I.P. mobile library. The contents of one book box displayed in front show the wide variety of reading material provided.

New Oxford English Reader. A new series of Oxford supplementary readers entitled *Stories of Our People* should be of interest to all users of the Oxford English Course. These readers will deal with the lives of outstanding men and women from Papua and New Guinea. The first title published is *Under the Mango Trees* (Dinah Frank).

Dinah Frank tells simply and beautifully of her early life and the memory of her father who died when she had been only a few years at school. Completing her schooling, she eventually married Frank, who co-operated by helping her establish the first school in her home village of Rogea, in New Guinea. War intervened, but Dinah and Frank gradually made the inhabitants education conscious, and the school developed from under the mangoes to a properly-constructed building. Her trials and successess are told in a story which most islanders will surely enjoy.

This small book of 16 pages is attractively produced and illustrated with three photographs. The price is A.2/-.

South Sea Island Recipes. This fourth revised edition of a popular book is arranged and issued by the Girl Guides' Association of Fiji. Containing 140 pages, it is priced at stg.7/6.

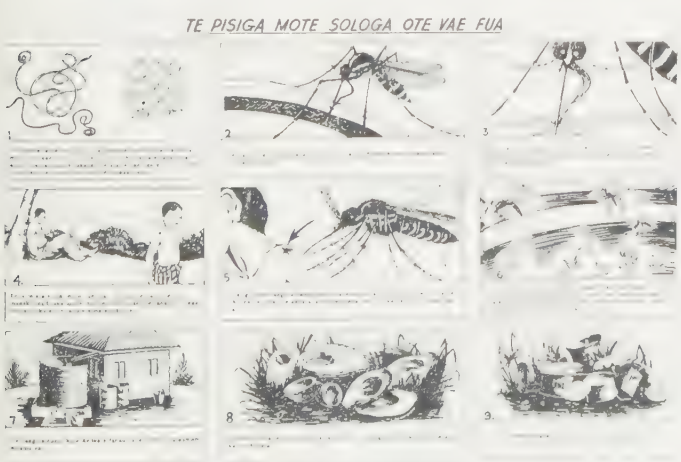
The book claims to be an aid to housewives in the South Sea islands, and a glance through the recipes by anyone who has lived there will confirm this.

New Filariasis Leaflets. Two new versions—one in Gilbertese and the other in the Ellice Islands language—of the illustrated health leaflet *Elephantiasis Can Be Prevented* have just been produced on behalf of the Medical Services, Gilbert and Ellice Islands Colony. Both leaflets are similar in appearance to the original version, which was produced in the Samoan language for the Government of Western Samoa, but with the text and illustrations amended by the Commission's Health Section to make them suitable for use in the Gilbert and Ellice Islands area.

The production of these leaflets is a good example of how existing material can be adapted to suit conditions elsewhere in the Pacific at considerably lower cost than that required for a completely new production.

The Literature Bureau would welcome enquiries and be glad to assist any territories requiring adapted versions of any existing leaflets or pamphlets, or in the preparation and production of new material to suit their own needs.

Poster Production. During recent months the Literature Bureau has arranged for the production of several new posters on behalf of various territories. These include (i), a



Centre pages of filariasis leaflet produced for the Gilbert & Ellice Islands.

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three-colour Malay version of the Commission's *Soap* poster for the Health Section, Netherlands New Guinea; (ii), a series of three co-operative posters for the Registrar of Co-operatives, Nouméa: two of these posters are adapted French versions of the English 2-colour posters *Mr. Wise and Mr. Foolish* and *Pulling Together,* while the third poster is a new one-colour production entitled *The Answer is Co-operation;* and (iii), four versions of two posters dealing with the rhinoceros beetle menace. One two-colour poster depicting the ravages of the beetle on the coconut palm has been produced in an English and Fijian version; the second poster is simply a large illustration of a rhinoceros beetle with the English caption *Watch Out for Oryctes.* This layout is also available without a caption to permit territories to arrange for local overprinting in vernacular languages.

The posters (i) and (ii) each measure 20" x 14", and those described in (iii) are 10" x 14".

Sample copies with details of production costs are available from the Literature Bureau, Box 5254, G.P.O., Sydney, Australia. Further enquiries from territorial administrations concerning the production of similar or other types of posters would be welcomed by the Bureau.

Tropical Food and Nutrition. The Literature Bureau received recently a copy of the June, 1958 (No. 5) issue of this booklet issued by the South Pacific Health Service, Suva, Fiji. In many parts of the Pacific, more particularly where the islanders have some continued contact with Europeans, these books have proved practical. They demonstrate how imagination and resourcefulness can bring variety and interest to dishes using the native foods which are frequently quite abundant.

Apart from the recipes, which include Indian dishes, various culinary uses of the pawpaw, and several jams and jellies manufactured from local fruits, this No. 5 issue contains some rational advice generally concerning diets of locally-grown island foods. One article explains how indigenous people compensate for inadequate amounts of certain essentials such as calcium, vitamins, and various mineral salts. Another extolls the versatility of the pawpaw, while a final two pages are devoted to the history and ceremony of kava-making and drinking.

Education departments and social welfare workers throughout the Pacific could gain much useful knowledge from these booklets. Copies are available from the Nutritionist, South Pacific Health Service, Box 13, Suva, Fiji, price stg. 1/-.

Film on Coffee Growing. A 16mm. black and white sound film entitled *A Story of Coffee* has been added to the Commission's film library. This film describes methods of growing and processing coffee on a typical plantation in the Sao Paulo region of Brazil; topics covered include stages of planting and transplanting, development of the trees, harvesting the crop, drying, grading and finally bagging the beans for shipment.

Any metropolitan or territorial government department interested in viewing this film can obtain it on free loan, in accordance with the conditions outlined in the Commission's *Film and Filmstrip Catalogue.*

Wider Interests For Pacific Women

(Continued from page 25)

is the result of a four-fold process of education or development, and went on to discuss the practical implications of this analysis in setting up the kind of women's interests project under consideration.

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A new series of supplementary readers is now being produced for use in conjunction with the *Oxford English Course for Papua and New Guinea.* The first two books in this series are:

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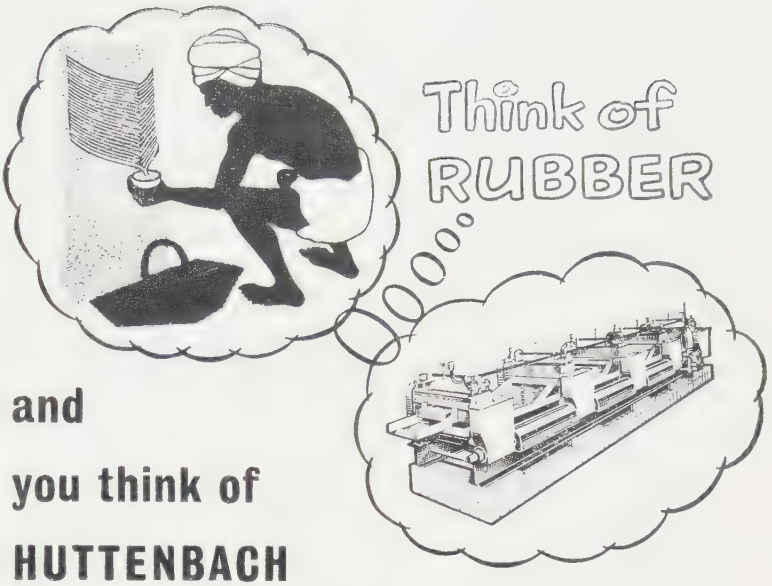

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SOLOMON ISLANDS: Mendana Enterprises Pty. Ltd., P.O. Box 73, Honiara.

Members of the Council then carried the discussion further. Their final recommendations are contained in the Report of the Ninth Meeting of the Research Council published by the Commission.*

Recognizing the immense value of much of the work already being done by women's organizations and voluntary workers in the Pacific, it is natural that several of the Council's recommendations supported further development of this kind of work. However, one or two aspects of the project will be of special interest to territories other than the selected project area itself, i.e. Aitutaki.

The Council fully realized that methods suited to one territory can seldom be transplanted wholesale to another. And it recognized, too, the wisdom of the United Church Women's request that the project be confined to a specific area, so as to avoid the danger of dissipating its efforts over too wide a field.

It should not be thought from this, however, that the project's influences and lessons will necessarily be confined to the island on which it will be located. The Research Council has pointed out that the experience of the project should help other territories to gain appreciation of how the manifold needs and activities in the field of women's interests may be better co-ordinated and related to other territorial activities for the general advancement of women and of the community as a whole.

It should also help territorial governments to assess the value of a women's interests officer and her place in the services of a territory as well as providing an opportunity for gaining a deeper understanding of methods and requirements for supporting women's interests activities. There can be little doubt that in the course of all this some practicable ways will be found by which inter-territorial co-operation in this field of activity may be developed.

The valuable experience of the Commission's women's interests officer will be put to good use in other ways too, notably in the training of a local counterpart to ensure the continuation and extension of the work at the end of the formal project period, and in the course of short working visits to other territories to assist them in developing their activities in this and related fields.

Provision has been made to permit the possible establishment of training centres and to assist the regular exchange of information between groups already formed.

The Research Council's suggestions were accepted by both the Commission and the United Church Women. As a result, the most happy working arrangement has been reached with United Church Women, and the Commission has made additional financial provision to enable it to play its own part.

Several territories enquired about the project being located in their area, and after an examination of all the problems and time factors involved, the request of the New Zealand Government and Cook Islands Administration to have the project in Aitutaki was accepted and it is there that the project will get under way shortly.

Later on it is hoped that the project may be extended to the British Solomon Islands Protectorate.

This, then, is the story of a project, or rather the beginning of one. For its second part will be that of the project itself, written during the next three years; and its third and most important part must be the future lives of the women of Aitutaki after the project is over.

It is thus an unusual story, for each part has a different author. Perhaps at times some of them have felt, as all authors do, that their labours were in vain; but now we can say, in the words of reviewers, that we look forward to another volume from their pen.

* Miss Gwilliam's analysis is also reprinted in full in the Report, and Professor Belshaw's notes on aided self-help, also included, cannot fail to be of value to those concerned with the work of women's groups. Much of the material would serve as an excellent basis for discussion group work by women's organizations themselves in the islands.

These Europeans

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South Pacific Commission Technical Papers

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NUTRITION

18. **Report on Nutrition Investigations by the South Pacific Commission in 1950.** November 1951.
22. **Chemical Composition of the Milk of New Hebridean Mothers.** F. E. Peters, biochemist, South Pacific Commission. February 1952.
23. **Nutrition Research Conducted in New Hebrides during 1951.** Sheila Malcolm, nutritionist, South Pacific Commission. April 1952.
50. **Nutrition Investigation in New Caledonia.** Sheila Malcolm. October 1953.
63. **Diet and Nutrition in American Samoa.** Sheila Malcolm. August 1954.
83. **Diet and Nutrition in the Trust Territory of the Pacific Islands.** Sheila Malcolm. July 1955.
85. **Etudes sur la Nutrition et l'Alimentation dans les Etablissements Francais de l'Oceanie** (Summary and Conclusion in English). Sheila Malcolm. April 1955.
95. **Bibliography of the Nutritional Aspects of the Coconut** (revised edition of T.P. 58). F. E. Peters. September 1956.
100. **Chemical Composition of South Pacific Foods**—An Annotated Bibliography. F. E. Peters. January 1957. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
106. **Some Food Problems In The Pacific Islands.** H. S. McKee. May 1957.
113. **The Diet of Mothers and Children on the Island of Guam.** Sheila Malcolm. January 1958.
115. **The Chemical Composition of South Pacific Foods.** F. E. Peters. January 1958.
118. **Nutrition and the Papuan Child.** H. A. P. C. Oomen and S. H. Malcolm. April 1958. (8/- stg., 10/-A., 9/-F., $1.20, 4G.)

PUBLIC HEALTH

12. **Tuberculosis Investigations by the South Pacific Commission in 1950.** May 1951.
24. **A Survey of Leprosy on the Island of Nauru.** Dr. C. J. Austin, Director, Makogai Leprosy Hospital, Fiji. April 1952.
27. **A Survey of Leprosy in the British Solomon Islands Protectorate.** Dr. C. J. Austin. July 1952.
56. **Leprosy in Netherlands New Guinea.** Dr. Norman R. Sloan. April 1954.
57. **Leprosy in the Trust Territory of the Pacific Islands.** Dr. Norman R. Sloan. April 1954.
62. **Leprosy in American Samoa.** Dr. Norman R. Sloan. July 1954.
64. **Dental Conditions in School Children of American Samoa.** Dr. Raymond G. Neubarth. August 1954.
67. **Ophthalmological Survey of the Trust Territory.** Dr. H. E. Crawford. September 1954.
69. **Leprosy in Western Samoa and the Cook Islands.** Dr. Norman R. Sloan. October, 1954
96. **Health Education In The South Pacific.** G. Loison and L. L. Keyes. September 1956.

MOSQUITO-BORNE DISEASES

17. **Conference of Experts on Filariasis and Elephantiasis, Tahiti: Summary of Proceedings.** September 1951.
33. **A Survey of Malaria in the British Solomon Islands Protectorate.** Dr. R. H. Black, School of Public Health and Tropical Medicine, University of Sydney. November 1952.
60. **Some Aspects of Malaria in the New Hebrides.** Dr. R. H. Black. May 1954.
61. **Malaria in the Trobriand Islands.** Dr. R. H. Black. May 1954.
65. **Annotated Bibliography of Filariasis and Elephantiasis.** September 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
66. **Distribution of Filariasis in the South Pacific Region.** Dr. M. O. T. Iyengar. September 1954. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
68. **Malaria in the Torres Straits Islands.** M. Josephine Mackerras and Dorothea F. Sandars. October 1954.
80. **Malaria Control and Research in Netherlands New Guinea.** Dr. R. H. Black. March 1955.
81. **Malaria in the South-West Pacific.** Dr. R. H. Black. March 1955.
86. **Distribution of Mosquitoes in the South Pacific Region.** Dr. M. O. T. Iyengar. 1955. (8/- stg., 10/-A., 9/-F., $1.20, 4G.)
88. **Annotated Bibliography of Filariasis and Elephantiasis. Part 2.** Dr. M. O. T. Iyengar. Jan. 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
104. **Developmental Stages Of Filariae In Mosquitoes.** Dr. M. O. T. Iyengar. May 1957.
105. **An Investigation On Filariasis In The Berau Region.** H. de Rook. May 1957.
109. **Annotated Bibliography of Filariasis and Elephantiasis. Part 3.** Dr. M. O. T. Iyengar. July 1957. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
110. **Enquete epidemiologique et entomologique sur la Filariose de Bancroft en Nouvelle-Caledonie et dependances.** M. Lacour et J. Rageau. (With Summary in English). August 1957.
117. **La repartition geographique des moustiques en Nouvelle-Caledonie et dependances.** J. Rageau. Mars 1958. (Available in French only).
119. **Enquete entomologique sur le Paludisme aux Nouvelles-Hebrides.** Jean Rageau et Guy Vervent. Janvier 1959. Available in French only. (25 francs CFP.)

TROPICAL CROPS

31. **Cocoa Plantation Management in Western Samoa.** D. R. A. Eden, General Manager, New Zealand Reparation Estates, and W. L. Edwards, Assistant General Manager. October 1952.
36. **Cocoa Growing in Fiji Islands.** D. H. Urquhart, former Director of Agriculture, Gold Coast. December 1952.
37. **Cocoa Growing in Netherlands New Guinea.** D. H. Urquhart. January 1953.
38. **Coffee Growing in New Caledonia.** D. H. Urquhart. January 1953.
39. **Cocoa Growing in Western Samoa.** D. H. Urquhart. January 1953.
40. **Cocoa Growing in New Hebrides.** D. H. Urquhart. January 1953.
48. **The Management of Coconut Plantations in Western Samoa.** D. R. A. Eden. September 1953.
82. **The Manufacture of Copra in the Pacific Islands.** W. V. D. Pieris. July 1955. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
87. **L'agriculture vivriere autochtone de la Nouvelle-Caledonie,** par Jacques Barrau; precedee de l'organisation sociale et coutumiere de la population autochtone, par Jean Guiart. Janvier 1956. Available in French only. (20/- stg., 25/-A., 22/6F., $3.00, 10G.)
94. **Food Plants of the South Sea Islands.** Dr. E. Massal and Jacques Barrau. September 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
97. **Rice Production In The South Pacific Region.** R. Watson. October 1956.

PESTS AND DISEASES OF PLANTS AND ANIMALS

9. **Report of Plant and Animal Quarantine Conference, Suva.** April 1951.
34. **Rhinoceros Beetle Control in the Kingdom of Tonga.** L. J. Dumbleton, Plant and Animal Quarantine Officer, South Pacific Commission. November 1952.
77. **A List of Diseases and Parasites of Animals Recorded in the South Pacific Territories.** Bilingual. December 1954.
78. **A List of Plant Diseases Recorded in South Pacific Territories.** Bilingual. December 1954.
79. **A List of Insect Pests Recorded in South Pacific Territories.** Bilingual. August 1955. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
101. **Parasites And Predators Introduced Into The Pacific Islands For The Biological Control Of Insects And Other Pests.** L. J. Dumbleton. March 1957.
107. **The Rhinoceros Beetle In Western Samoa.** R. A. Cumber. June 1957. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)
116. **Contribution a l'Etude des Cochenilles d'Interet Economique de Nouvelle-Caledonie et Dependances,** par F. Cohic. Fevrier 1958. Available in French only.

ECONOMIC CONDITIONS

54. **The Pacific Islander and Modern Commerce.** V. D. Stace, Assistant Economist, Reserve Bank of New Zealand. March 1954.
89. **Small-Scale Industry for the South Pacific—Preliminary Papers.** Cyril S. Belshaw. March 1956. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)
90. **Industrial Activity in Selected Areas of the South Pacific.** K. H. Danks. March 1956. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
91. **Western Samoa—An Economic Survey.** V. D. Stace. June 1956. (6/- stg., 7/6A., 6/9F., $0.90, 3G.)
92. **Economic Aspects of the Coconut Industry in the South Pacific.** E. J. E. Lefort. September 1956. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)

CURRENT RESEARCH

29. **Current Research in the South Pacific in the Field of Economic Development.** July 1952.
43. **Research in Queensland in Tropical Plant and Animal Industries.** Jacques Barrau, Technical Officer, South Pacific Commission. May 1953.
98. **Social Science Research In The Pacific Islands.** November 1956. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)

* Abbreviations used in the above list for the currencies quoted are: stg. (sterling); A (Australian); F (Fijian); $ (United States dollars); G (New Guinea guilders).

102. **Index Of Social Science Research Theses On The South Pacific.** April 1957. (4/- stg., 5/-A., 4/6F., $0.60, 2G.)

CO-OPERATIVES

1. **The Co-operative Movement in the Gilbert and Ellice Islands.** H. E. Maude. February 1949.
42. **The Co-operative Movement in Papua and New Guinea.** Prepared by the Registry of Co-operative Societies, Port Moresby. February 1953.
51. **A Bibliography of Co-operation in the South Pacific.** December 1953.
75. **Catalogue of the Commission's Co-operative Library** (Bibliography of Co-operation). January 1955. (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
120. **A Guide to the Marketing of Copra in Primary Co-operative Societies.** C. G. Joannides. January 1959.
121. **Catalogue of the S.P.C. Co-operative Library.** January 1959. (Revised edition of T.P. 75.) (5/- stg., 6/3A., 5/6F., $0.75, 2.50G.)
123. **Co-operatives in the South Pacific.** (Report of the SPC Technical Meeting on Co-operatives held at Port Moresby July 21-August 1, 1958.) February 1959.

COMMUNITY DEVELOPMENT

2. **Community Development.** March 1950.
11. **Interim Reports on the Moturiki (Fiji) Community Development Project.** Howard Hayden, Director of Education, Fiji. May 1951.
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